JANUARY, 1956

American Engineer

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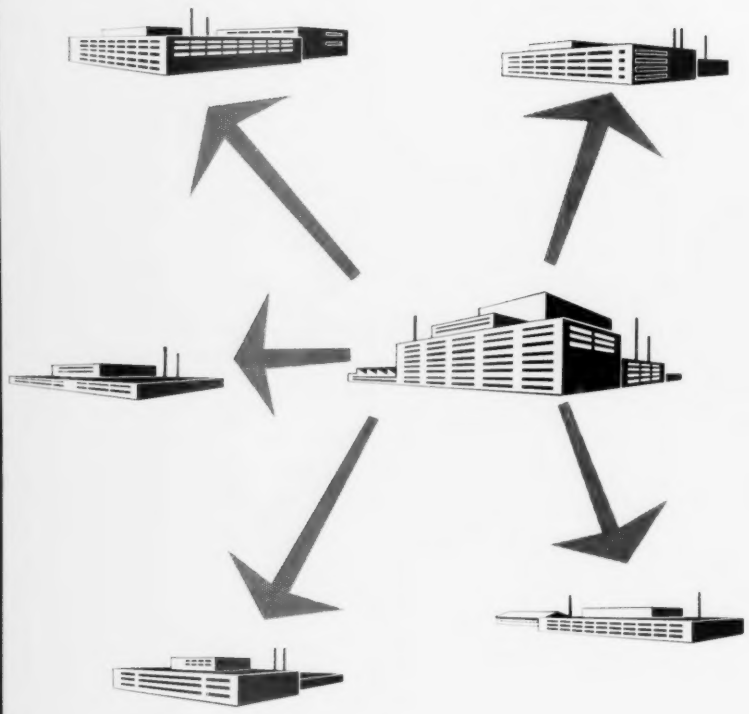
Decentralization and Effective Management

By

DON G. MITCHELL,

Chairman of the Board and President, Sylvania Electric Products, Inc.



Mr. Mitchell

Progressing with Our Functional Groups in the Ohio Society by C. Ramond Hanes, P.E.

AE Special Report Re: Education and Soviet Professional Manpower

Photo Story: "Variety" Is the Word for Research at NYU

Plus **Book Looks • Wage-Hour Testimony • Late Capitol Hill Report**

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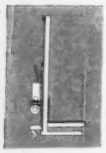

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Letters to the Editor

P.E. Exams . . .

Dear Editor:

I have read with much interest and appreciation Mr. Anatole Konstantin's letter in your November issue . . . page 4.

However, my own experiences with the New York State Board of Examiners have been in a much better light. I do not believe it is the purpose of any State Board to impose undue hardship on an applicant's efforts to achieve professional status. The applicant will always find that he can appeal for relief, and find a listening ear.

As I see it there are seven salient points which must be examined before a prospective candidate should consider application:

1. Age . . . minimum 25 years for full P.E.
2. High school graduation or equivalent. (Minimum educational requirement)
3. Presently employed in engineering work.
4. Must meet years of experience requirements set by board of examiners.
5. Responsible charge of work and/or men.
6. Work of a repetitive nature not acceptable.
7. Personally acquainted with professional engineers.

The . . . candidate should explore these features before he embarks on the venture of refresher courses or study aids. He should have sent in his application and received word to "go ahead." This can save him many a headache later.

JOHN D. CONSTANCE, P.E.,
Cliffside Park, N. J.

Money and Prestige . . .

Dear Editor:

Engineer Brands' contribution to —PP— in the November issue recalls to mind a limerick I came upon somewhere during the "roaring twenties" which went something like this:

Said a teacher of great erudition,
"I deplore the poor workmen's condition."
When he learned what they earned
His profession he spurned
And became a high-paid mechanician.

It seems that in times of prosperity, this same reaction invariably develops. But in periods of depression, the bricklayer is the low man on the totem pole, spending a high percentage of his time on relief. The engineer may descend several rungs on the economic ladder, but if he is any good he usually manages to hang on to some kind of a job.

A further point is that "man does not live by bread alone," which is to say that there are many compensations to being a professional man which do not lend themselves to monetary measurement.

Nevertheless, Engineer Brands is quite right in his view that one of the most potent ways to get more engineers is to provide them with the means to obtain more and better "bread" and the wherewithal to provide their children with the mental training they will be in dire need of in this increasingly competitive world.

CARL A. POPPINO, P.E.,
Phoenix, Ariz.

TVA . . .

Dear Editor:

I have noted with interest the articles (on proposed TVA legislation) by NSPE President Allison Neff, and his letter to Senator Kerr, with his well-phrased reply to Mr. Gene M. Wilhoite of TVA. (AE, September, October, 1955).

It is wonderful. I hope this trend of Society policy continues, and that we continue to remind men in high places, and ourselves, that knowledge of natural laws and ignorance of civil laws do not make a man a professional engineer, while intended violation of civil law is not as forgivable for him as for a common criminal. . . .

C. O. CLARK, P.E.,
Tulsa, Okla.

An Appeal . . .

Dear Editor:

May I call your attention to the urgent need for engineers in the field of high school teaching. If engineers and technicians are to be trained, we must have the necessary teaching personnel. We would deeply appreciate calling to the attention of your readers, the job requirements (qualifications) of the Board of Education of the City of New York.

The basic job facts of interest to potential teachers with engineering training are these:

1. Graduation from a four year engineering school is required.
2. Minimum engineering experience is three years.
3. Starting salary of a regular teacher who has had five years of engineering experience is $4888. If he has a master's degree it is $5288. Increments bring the salary up to a maximum of $7200 over a period of years; to $7600 with a master's degree. This salary continues until retirement.
4. The required courses in education may be taken within three years following the teaching examination.
5. There are numerous opportunities for advancement to higher paying positions.
6. There are many "fringe" benefits, some of which include tenure, pension, health benefits, sick leave, insurance after a number of years of service, etc.

For further information call or write to Nathan Clark, Supervisor, Related Technical Subjects, Board of Education, 110 Livingston Street, Brooklyn 1, New York.

I hope that you will be able to assist us in our search for interested and qualified teaching personnel.

NATHAN CLARK,
Brooklyn, N. Y.

Capital Is Scene of Spring Meet

P.E.'s from throughout the country plus many prominent engineering leaders from the Nation's Capital will be on hand for the variety of functions scheduled for the National Society's Spring Meeting to be held in Washington on February 17 and 18 at the Mayflower Hotel.

The professional and business sessions of the two-day event will be presided over by Allison C. Neff, president of NSPE. Reports will be received from the heads of the various NSPE committees, and recommendations for official action will be submitted for the consideration of the Board of Directors by the Society leaders.

It is expected that much discussion will be given to the formation of functional groups, in which a number of NSPE-affiliated state societies have evinced considerable interest following the Board's approval of their establishment within the NSPE framework at the October meeting in Memphis, Tennessee.

Another topic of major interest will be the completion of final plans for the observance of National Engineers' Week, February 19-25. (See story, page 33.) The observance of the Week marks one of the major public relations efforts by the National Society; and the Spring Banquet, which is scheduled for the 17th at the Mayflower, will be in effect the "kickoff" for the many similar banquets which will be sponsored by NSPE groups throughout the country during the following week to spotlight the contribution of the engineering profession to the welfare of the Nation. A nationally-prominent speaker, whose name will be announced shortly, will address the NSPE members and District of Columbia civic leaders on this occasion.

Another important event on the program for the 17th will be the formal dedication of the Society's new headquarters building now nearing completion at 2029 K Street, Northwest, in downtown Washington. President Neff and other leading engineers will speak at this dedication, at which Federal engineering officials, the Commissioners of the District of Columbia, and others are expected to be guests of honor. A dedication party

(*Continued on page* 33)

Can You Call a Man a "Failure" at Thirty?

Men who think that success is only a matter of "a few years" are failures . . . however young they are!

How often have you heard some young man in business say, "I'll admit the job I have now isn't much but, after all, I'm only in my twenties."

Or: "Just about every executive in the company I work for is between 45 and 65. I have plenty of time to get ahead."

This *mistaken* idea that success comes automatically with time is easy to understand. Promotions do come regularly and effortlessly to young men of promise. *But* the day arrives, often abruptly, when that promise must be *fulfilled*. Native ability and intelligence can carry a man only to the midway point in business—beyond that he must *prove* his capacity to justify a position of executive responsibility. That calls for a practical, working knowledge of business fundamentals.

The time to build that knowledge—to lay a solid groundwork for your future progress—is now . . . *now* while time is still on your side. If you fail to recognize that fact, you'll know only struggling, skimping and regret when your earning power should be at its height.

HALF the world is half asleep! Men who could be making twice their present salaries are coasting along, hoping for promotions but doing nothing to bring themselves forcefully to the attention of management. They're wasting the most fruitful years of their business lives . . . throwing away thousands of dollars they'll never be able to make up.

If *you* want to discover how to start to succeed while you're still young—if you want to avoid the heartbreak of failure in later years—send today for "Forging Ahead in Business" . . . one of the most practical and helpful booklets ever written on the problems of personal advancement. You will discover what the qualifications of an executive are in today's competitive market . . . what you must know to make $15,000, $20,000 or more a year . . . what you must *do* to accumulate this knowledge.

"Forging Ahead in Business" was written for ambitious men who seriously want to get down to bed-rock in their thinking about their business future; there's no charge for the booklet because, frankly, we've never been able to set a price on it that would reflect its true value. Some men have found a fortune in its pages. If you feel that it's meant for you, simply fill out and return this coupon. Your complimentary copy will be mailed to you promptly.

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PROFESSIONAL NEWS IN CAPSULE FORM

A Roundup of Late Events for Professional Engineers

New Jersey Award Goes to Engineer

The first New Jersey Professional Achievement Award, recently established by Governor Robert Meyner and the State Civil Service Commission, has been presented to Morris Goodkind of New Brunswick, the just-retired chief bridge engineer of the State Highway Department. Mr. Goodkind, who served with the Highway Department for more than thirty years, is a past vice president of the National Society of Professional Engineers. He has also been president of the Middlesex County Chapter and the New Jersey SPE.

He is a graduate of Columbia University and has received honorary degrees from Rutgers and the Newark College of Engineering. He is also active in the ASCE.

"I kept telling you it was a *big* job!"

Brazil Honors Steinman

The Brazilian Government has conferred upon Dr. D. B. Steinman, NSPE's first president, its *Marechal Caetano de Faria* Medal in recognition of his professional achievements and his engineering contributions to Brazil.

Dr. Steinman, who is world famous as a bridge builder, designed and built the Florianopolis Bridge over the waters of the Atlantic Ocean between the island-city of Florianopolis and the mainland of Brazil. It is the largest bridge in South America and the longest eyebar suspension span in the world.

The medal and a certificate were presented to Dr. Steinman in a special ceremony at the Brazilian Embassy in Washington, D. C.

DuBridge Heads Air Pollution Group

Dr. Lee A. DuBridge, president of the California Institute of Technology, has been elected chairman of the Board of Trustees of the Air Pollution Foundation, of which he is one of the founders. The Foundation is an independent scientific research organization dedicated to the elimination of the smog problem.

Dr. DuBridge succeeds Dr. Raymond B. Allen, chancellor of the University of California at Los Angeles, in the board chairmanship.

Role of Science In UNESCO Explained

"We must seek a way of ensuring that our advances in science shall be used primarily, and hopefully entirely, for the benefit of all peoples," is the opinion of Dr. Athelstan F. Spilhaus, dean of the University of Minnesota's Institute of Technology and a well-known member of the Minnesota SPE and NSPE.

Dean Spilhaus, who is a United States delegate to UNESCO (United Nations Educational, Scientific and Cultural Organizations), spoke at the recent fifth national conference of the United States National Commission for UNESCO, explaining the role of science and technology in the UNESCO program as he envisions it.

He emphasized that "science and technology of themselves do not contribute to UNESCO's objective without the multipliers of education and communication."

"Whether it be in . . . large projects or whether it be in small ones," he said, "the preparation of human beings to accept the technological improvement is as important as the improvement itself."

"UNESCO's role," he continued, "is as a trigger mechanism, a catalyst which sets off the great forces of voluntary national and individual effort and self-help. In science UNESCO should not do research: it should not attempt to provide ideas—it should devote itself to helping others to use their magnificent ideas and research more widely on the international scene."

Dr. J. C. Boyce Gets Illinois Tech Post

Illinois Institute of Technology, Chicago, has named Dr. Joseph C. Boyce, associate director of the Argonne National Laboratory, as vice president of academic affairs and dean of the Graduate School. The appointment became effective Dec. 1.

At the Argonne Laboratory, located southwest of Chicago and one of the principal research centers maintained by the Atomic Energy Commission, Dr. Boyce has been responsible for its relations with Midwest colleges, universities, and non-profit research institutions which participate with the AEC in a program directed toward continued progress of atomic energy research and development.

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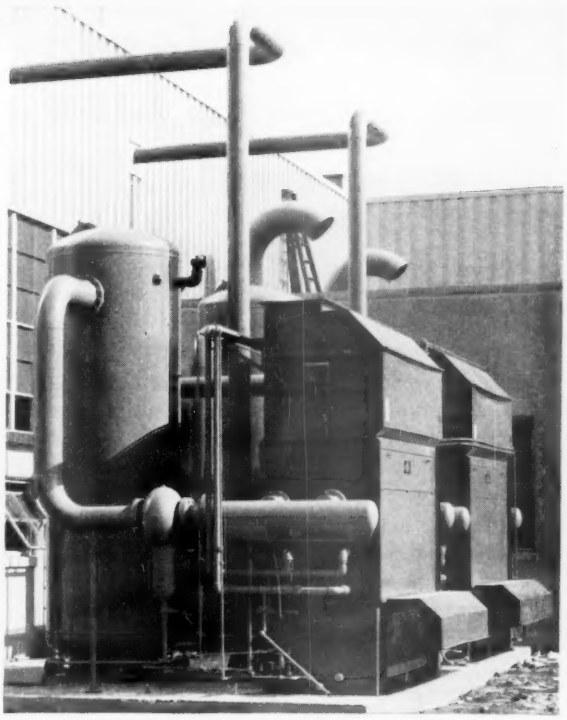
Doctor to Receive Engineers' Award

The first person in the medical profession ever to receive the highest award of the American Society of Heating and Air-Conditioning Engineers is Robert W. Keeton, M.D., of Chicago. Dr. Keeton will be presented with the F. Paul Anderson Medal of the Society during the 62nd annual meeting scheduled for January 23-25 in Cincinnati.

A former professor and head of the Department of Internal Medicine at the University of Illinois prior to his retirement in 1951, Dr. Keeton has been active in the cooperative research conducted by the Society and the University on man's physiological adjustment to environment.



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More Work for Peace Needed, Says Furnas

The Nation should put more thought to discovering "the best ways and means of beating more of the swords into plowshares as rapidly as possible," according to Dr. Clifford C. Furnas, Assistant Secretary of Defense for Research and Development.

Speaking at the dedication of the new research buildings of the Cornell Aeronautical Laboratory, Inc., in Buffalo, New York, Dr. Furnas, who was formerly director of the laboratory, said that given ample time most of the peaceful potentials in military developments are eventually forthcoming, but that the lag is usually years, if not decades.

"Technical information which might be of aid to a possible enemy most assuredly must be kept under wraps as long as that possibility exists," he said. "However, security systems have a great lag and inertia and some developments are kept in the secret category long after such precautions are unnecessary and meaningless."

He stated that "it does appear that as a nation we are not taking full advantage of the possible eventual peaceful benefits of many military developments.

"We will begin to win the peace when we demonstrate, internally and externally, that the way of life which is evolving in America offers a technological, industrial, economic, commercial and sociological pattern which is decidedly superior to that which can be associated with the Communist or other ideologies."

Dr. Furnas also urged increased support for fundamental research, pointing out that in the long run it will add to both our military strength and our potential for winning the peace.

Independent Labs Re-Elect Herron

Lewis F. Herron, president of the James H. Herron Company of Cleveland and a member of the Ohio SPE, was re-elected president of the American Council of Independent Laboratories during the organization's recent annual convention in Phoenix, Arizona.

Other officers, also re-elected, include: Dr. Alvin Purdy, Bull & Roberts, Inc., New York City—vice president; Dr. Roger W. Truesdail, Truesdail Laboratories, Inc., Los Angeles — secretary; and F. H. Wright, Lucius Pitkin, Inc., New York City—treasurer.

. . . more briefs on page 8

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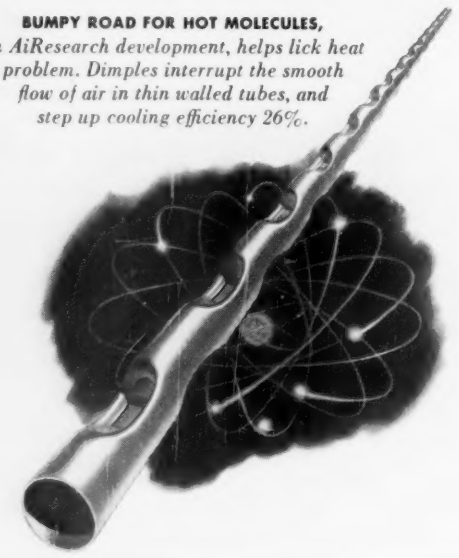

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Pakistan Project For Corps of Engineers

The United States Army's Corps of Engineers is starting a construction program in Pakistan under a Mutual Aid Agreement concluded between the United States and Pakistan, according to a Department of the Army announcement.

Corps of Engineers Mediterranean Division Engineer, Brigadier General B. B. Talley, has been in Karachi making preliminary arrangements for the start of the program. The District Engineer Office being established in Karachi will be headed by Colonel William A. Davis, who, since 1952, has been the Deputy Chief of Staff for Administration, Armed Forces Special Weapons Project, Washington, D. C.

Air, sea and land defenses of Pakistan will be significantly improved by the construction program, said the Chief of Engineers, Lieutenant General S. D. Sturgis, Jr. Existing airfields will be improved to accommodate high performance jet aircraft being furnished Pakistan under the Mutual Defense Assistance Program; port facilities will be improved to accommodate ships being furnished to the Pakistan Navy; and Army facilities will be expanded to take care of tanks and other heavy equipment.

J. Ward Percy Holds ISA Office

J. Ward Percy of the Fundamental Research Laboratory, U. S. Steel Corporation, Kearney, New Jersey, and a prominent member of the New Jersey SPE and NSPE, is a newly elected vice president of the Instrument Society of America. He is responsible for the ISA's Recommended Practices Division.

Other new officers of the Society are: Robert T. Sheen, president; Richard N. Pond, also a vice president; and Dr. William G. Brombacher, secretary.

Noah S. Davis Heads Rocket Society

Dr. Noah S. Davis, well-known chemical engineer and manager of the Special Products Department of the Becco Chemical Division of the Food Machinery and Chemical Corporation, Buffalo, New York, has been elected president of the American Rocket Society.

With Becco since 1946, Dr. Davis has been in charge of the company's work on the development of concentrated hydrogen peroxide for military uses. It is of paramount importance in the propulsion of many types of rockets, guided missiles, and certain aircraft.

Dr. Davis, who holds the Army's Commendation with an oak leaf cluster for his work during World War II with the Chemical Warfare Service, is the co-author of numerous papers on the subject of rocketry.

Twichell Receives Eisenhower Appointment

Trigg Twichell of Austin, Texas, a well-known member of the Texas Society of Professional Engineers and NSPE, has recently received a Presidential appointment. President Eisenhower has named him to be Federal representative for the Arkansas River compact negotiations.

Mr. Twichell has been district engineer with the U. S. Geological Survey in the Surface Water Bureau of the Texas District.

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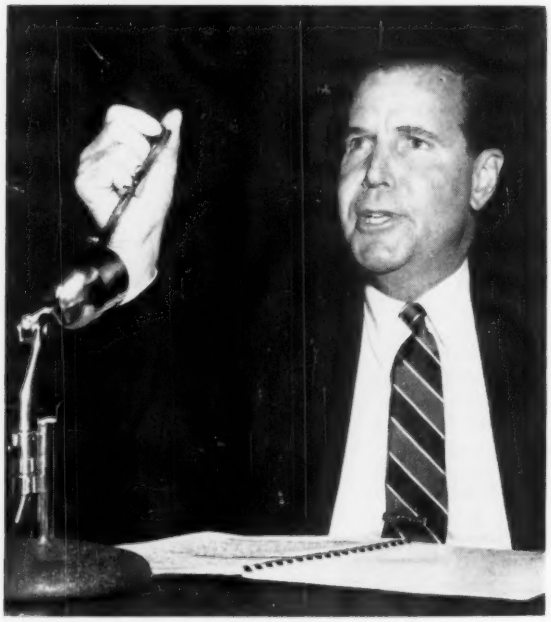

Mr. Mitchell

Decentralization and Effective Management

By

DON G. MITCHELL

Chairman of the Board of Directors
and President
Sylvania Electric Products, Inc.

WHEN I first started out in industry, I had the good fortune to talk to a man of broad experience in the electrical manufacturing business. To him I made the remark so typical of the newcomer—that there appeared to be so many, many competitors and so few really good positions available. His answer was succinct and immediate. "The competition," he said, "is greatest at the lower levels; there is always room at the top."

And how right he was! There always is room at the top. And today there is more room than ever for two particular reasons. The first, of course, is the continued growth and expansion of American industry, the creation of many new industries with the advance of technology and science. The second reason lies in the always-changing structure of business and industry; it is crystallized in the phrase being heard more and more frequently these days —*decentralization of management.*

Engineers, I believe, have a sort of "vested interest" in this decentralization because it is a trend that has brought many more of these technically trained men with their fine capacity for precise analysis and the logical formulation of sound decisions into the management echelons, and also because, in some cases at least, it has been partially dictated by the need to give the management reins to a man who has the technical knowledge necessary to insure constructive action in a highly specialized division, or plant, or area of operations.

Let me make it very clear, however, that decentralization is quite a different thing from dispersion, the mere scattering of manufacturing plants in various communities. Decentralization is rather the setting up of autonomous units and the delegating of complete authority and responsibility for their operation to their managers. In effect, these units become separate businesses operating within the broad framework of company-wide policies, not only in such obvious areas as production control and finance but in all the other basic staff levels as well. Such

Decentralization, the author believes, has brought many technically trained men into management echelons.

Decentralization is quite different from dispersion, the mere scattering of plants in various communities. Under true decentralization the manager of a new plant such as this one is really the boss and can use his abilities to give on-the-spot leadership toward becoming a part of the community life.

decentralized units may or may not be dispersed. Ordinarily the decentralization arrangement seems to work out better when they are dispersed, but that does not mean that the concentration of plant facilities in one community precludes effective management decentralization when other factors indicate its need or desirability.

In the decentralization pattern—which we find very effective at Sylvania, although it should be remembered that it is not by any means adaptable to all industries—you really put the manager on his own. "This is *your* plant," you tell him. "*You* decide what to do and when to do it. We have set out the ground rules, the broad policies and controls, but it is strictly up to you to figure out how to operate under them."

This, we have found, has a very stimulating effect. It gives the manager a sense of pride; it creates dynamism. The man *has* to be dynamic if he is going to carry out the assignment successfully. He *has* to be a leader, and he feels a very urgent responsibility to prove the worth of his leadership.

FURTHERMORE, that attitude permeates down through the entire organization. Everyone in that autonomously-operated facility, from the receptionist at the front door of the plant to the shipping clerk at the rear, knows that the local manager is running the show and sees that the actions of each individual have a direct effect on the success of the operation. Decentralization creates a sense of individualism—and of individual responsibility—in sharp contrast to the "only-a-cog-in-the-wheel" feeling evinced by many employees of industries whose management gives on-paper orders from far away.

As a matter of fact, it sometimes seems to me that far too much emphasis is given to a manufacturing technique or process in itself and not to the point of view, the attitude, the talent that created that process or technique in the first place. In the final analysis, all companies can develop or purchase just about the same types of machines, and the same raw materials. The difference between the growing company and the failing one is in the individual—the man or woman who uses the machine or the raw material. Any company's priceless assets are its *people*—and nothing more. We have found that a system of decentralization brings out the best in our people by inculcating in them this attitude of individual responsibility and pride in accomplishment.

Also, the decentralized plant frequently has a better score in its public relations rating in the area in which it is located. It is looked on as an integral part of the community, not as an interloper. When necessary, local officials and civic leaders know they can get to the top man, not merely to the representative of a Mister Big who is hundreds of miles away and relatively unconcerned about local affairs or any industry-community problems that may have arisen.

So far I have painted a pretty glowing picture of decentralization and how it works in favor of effective management. However, there is another element in the system which can never be forgotten even for an instant. I might put it somewhat in the style of a formula by stating that at Sylvania we have found that effective management stems from decentralization *plus* communications.

Without good, clear lines of communications in a decentralized industry, you can wind up with a tangled mass of separate operations, each on its own wavelength and doing as it pleases, forgetful of those basic ground rules under which it is supposed to operate. In other words,

when we extol the feeling of individualism that the system can develop, we do not refer to extremes of working independence which would defeat the very purpose for which decentralization of management is introduced.

The personnel of the decentralized operation are still "part of the team." What decentralization has accomplished has been to give them a sense of *identity* on that team, coupled with a healthy respect and enthusiasm for their individual jobs, an appreciation of the contribution that is expected of each of those jobs, and the freedom to do those jobs well in an atmosphere where individual opinions matter and individual performance counts.

BUT back to the problem of good communications—which is always of particular interest to engineers, too. At Sylvania, we have developed something called the "Operations Planning Committee," which we believe is very efficient in seeing that information and opinions make clear progress up—and down—the executive ladder. This committee, whose function is to review the activities of the various staff organizations throughout the company, is composed of myself as chairman, the staff officers and department heads, and the operating vice presidents. No decisions are made by the committee. However, through discussions with the individual responsible for a given operation, points of view are freely exchanged, and the net result is that the various groups thereby take a coordinated approach to their problems and orient their operations to the over-all needs and objectives of the company.

When we first organized this committee, we had each of the various operating vice presidents present a review of their current operations and future plans. So much benefit was derived from these sessions, however, that we broadened the communications base to include not only the operating vice presidents, but also all of the division general managers and the staff department heads. In the free exchange of points of view with regard to operating policies, production aims, and so on, we are, I believe,

The author says that engineers with management ambitions must become acquainted with the humanities, with economics, with history, and many other such studies.

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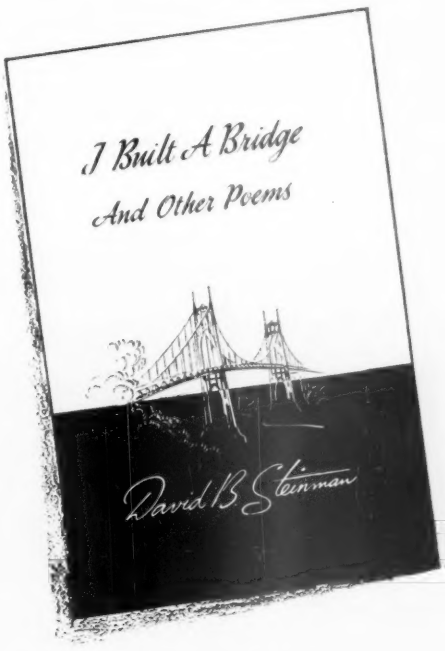

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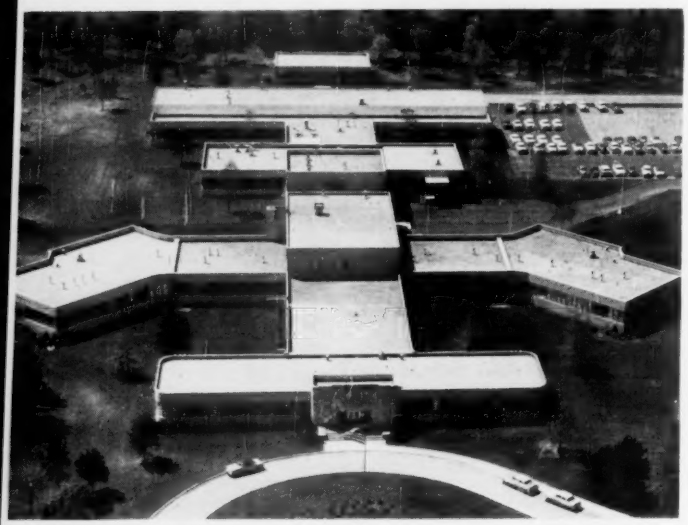
achieving a remarkable sense of unity and a comprehensive company-wide appreciation of every program and division with all the specialized problems involved.

We also place a lot of emphasis on the "package" presentation at Sylvania. That is, when someone wants to sell an idea to the company's top management, we like it presented in a "package" which describes the idea, tells what is new and unusual about it, how much it will cost, and how it is related to our over-all objectives. And that is how we like to hear about problems, too. The good manager not only presents the problem with which he is faced in his division to top management, but he also offers his own well thought out formula for its solution. This is very much like what the Army calls "completed staff action." Ideally, at least, all you have to do is to write "yes" or "no" across the package and hand it back.

This may sound like an oversimplification to some; but actually, if the chief executive cannot command this sort



In a large operation under one roof, communications may be easier to maintain than when decentralization is widely used. Communications, however, are an essential and must never be sacrificed.

of positive and efficient support from his managers, the quality of his own leadership will suffer, and this dangerous weakness will be felt right back down the line.

This brings us, of course, to the consideration of the sort of persons who are filling the positions in the various levels of management because, regardless of how you decentralize or how you keep your communications channels open and available, if you don't have men with good management potential on your team, if you don't have the right men in the right management spots, you are playing a losing game.

What sort of person is ideal management material then? —I believe that Dr. Henry Heald, the Chancellor of New York University, gave a very cogent reply to that question when he stated: "The answer is *educated people*—specialists, to be sure, in many cases, but also men and women broadly trained and liberally educated—men and women of ability, character, integrity, and a high sense of personal responsibility for good citizenship." That is one reason why engineers with management ambitions are urged to become acquainted with the humanities, with economics, with history, and many other such subjects in addition to pursuing their technological studies.

I POINTED out earlier in this article that its people are the primary asset of any company, ahead of products and techniques and so forth. Thus, when a man joins the management team, the first thing he has to deal with is not the product or the method of production, but the people who make the manufacture of the product possible, whether they are in the accounting department, the research laboratory, or in the manufacturing plant. That requires a thorough knowledge of human relations, an understanding and an appreciation of people, which is often almost innate in the talented, qualified man, but which in any case cannot be learned in a class in engine design.

Moreover, in addition to dealing with the people under his authority as far as his day-by-day operations are concerned, the manager must also keep in mind his responsibilities to many other people—the stockholders or owners of the industry or business, the customers, without whose acceptance an industry could not exist, and the public as a whole in whose interest every organization must operate or else pass into oblivion.

But again, dealing with people is only the first aspect of the management picture. And thus, finding and training the all-around man who can make the management grade is one of the major problems of American industry today. Bigger and better management development programs seem to be the order of the day, but let us not forget either that in many ways executive development ought to be an implicit part of a company's day-by-day routine. In other words, you don't drop everything to develop managers: the entire process is keyed to, and becomes a part of your basic operations.

At Sylvania, we call our program "Guided Experience," but before going into that in any detail, perhaps it might be well to consider the sort of approach that should be used toward the initial establishment of an executive development program. In this approach, there are four basic, orderly steps which must be taken to insure the establishment of a sound executive development program.

First, the over-all organization should be analyzed and its objectives reviewed. One particularly effective way to accomplish this first step is to ask everyone in top management to tell you what he feels the company's objectives are. Then, when there is finally an agreement about the objectives, the organization's structure is analyzed to see whether it is set up to bring about their accomplishment. Quite frequently, this process of analysis produces some major surprises—even major disagreements of interpretation among your top men—and you may well find that, where one objective is being more than adequately attacked, another equally important one is being virtually ignored because of the organizational pattern followed.

Secondly, the functions and responsibilities of each management position should be determined, together with the qualifications necessary to perform the requirements of the position. The net result of this, of course, is the "job description" or "position guide." This also helps bring to light and realign any areas where the assignment of responsibility may be vague or uncertain or even "a bone of contention" among the management men.

The third step involves the making of an inventory and appraisal of all present management personnel, assessing both present performance and potential for future growth. The result of this is the determination of a reasonably complete "case history," which indicates an individual's strengths and weaknesses so that it can be decided whether additional development is indicated and, if so, what it should be. This should show up, for instance, whether your engineer-manager has a sufficient grasp of the prob-

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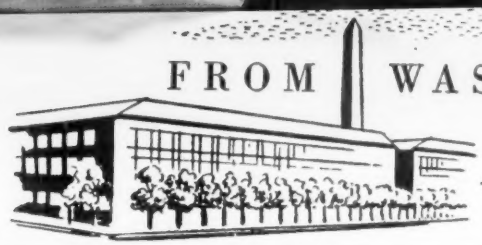


FROM WASHINGTON

By
Milton F. Lunch,
N.S.P.E.'s Legislative Analyst

CAPITOL HILL LOOKS AT AUTOMATION'S INFLUENCE ON THE ENGINEERING PROFESSION

THE Subcommittee on Economic Stabilization of the Congressional Joint Committee on the Economic Report recently completed hearings which it termed "the first congressional recognition of this important postwar trend called automation, which has had and promises to continue to have a great effect upon our lives and the operations of the economy in the future." On the basis of the extensive hearings, the Subcommittee could have added with justification a further reference to automation's present and promised impact on the engineering profession.

Those interested in either or both of these aspects of automation would do well to invest ten cents for a copy of the Subcommittee report, called "Automation and Technological Change." And those who are interested deeply in automation may find it profitable to invest two dollars for a copy of the 644-page hearing under the same name. Both publications are available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The impressive list of witnesses before the Subcommittee, headed by Representative Wright Patman of Texas, included government officials, labor union leaders, industrialists, scientists, engineers and educators. The hearings disclosed a striking degree of accord among the experts that automation is to be welcomed, not feared, but that it will create difficult problems of adjustment for individuals and industries, and will produce new economic and social problems.

The Subcommittee's report said that "the most disturbing thing which came to the subcommittee's attention during the hearings was the near unanimous conclusion of the witnesses that the Nation is faced with a threatened shortage of scientists, technicians, and skilled labor." The report added: "we can certainly not dismiss lightly the generally accepted evidence that professional engineers are currently being graduated at a rate nearly twice as fast in Russia as in this country, and that technicians are currently being turned out at 30 or 40 times our rate."

To meet what it termed the most disturbing aspect of the study, the Subcommittee recommended and strongly urged "that the Federal executive agencies, the appropriate committees of the Congress, the State and local governments, and all others involved take very seriously to heart the need for a specific and broad program to promote secondary and higher education, to the largest extent possible." Like other governmental and congressional bodies which have delved into the question of engineering and scientific manpower supply, the automation group did not offer specific or detailed recommendations.

Mr.
Walter Reuther
of the
AFL-CIO

Chairman Patman queried almost every witness about ways and means to train more engineers and scientists, and almost every answer agreed that the problem must be tackled first at the secondary and high school level. In addition, a number of the witnesses indicated that the problem involved economic facts, government financing, aid to the universities and greater prestige for teachers. For instance, Walter Reuther, President of the CIO (now head of the industrial union division of the merged AFL-

(Please turn the page)

CIO), said, "We are dangerously short of engineers," and urged a scholarship program "that will facilitate educational opportunities of every child, commensurate with the capacity of that child to grow, not limited by the economic circumstances of the family in which the child grew up."

One of the encouraging facts about the Reuther testimony, as well as that of other labor union leaders, was the clear recognition of a distinction between "professional engineers" and "technicians." These witnesses stressed, as did the industrial leaders, that the need embraces both categories, but that they are not the same; a distinction which has not always been recognized in the past.

Ralph J. Cordiner, President of the General Electric Company, in response to Chairman Patman's questions about how more young people can be attracted into engineering and science study said: "My personal opinion is that the law of supply and demand is going to work. You see in the Sunday papers so many competitive ads for engineers that these young students are going to come to realize they can sell their talents at a higher price with a technical education than otherwise." The same thought was expressed by Robert C. Tait, President, Stromberg-Carlson Co., and Senior Vice President, General Dynamics Corporation, who told the Subcommittee: "The way our system I think would correct it—and it is taking place now—is that the engineering shortage will put such a premium on themselves that they will get paid more than other people, and as their pay gets above other people, more lads taking a look at what is coming will go into engineering."

G.E.'s Cordiner also pointed out that one of the basic problems in producing more engineers and scientists is the fact that the universities are in financial straits—"I think there is also a very deep and penetrating problem that the average student graduate of a school—any of us in this room—may fail to recognize: While we are on the campus we only pay about half the cost of our education. Until you can awaken the graduates to the fact that they owe their school, particularly the privately endowed schools, for that other half, and until they pay that debt afterward, I think you will have this as a continuing problem." This observation was part of a general discussion, spread among a number of witnesses, as to the wisdom of establishing a government scholarship program for engineering and science study and subsidizing the schools.

As its final witnesses, the Subcommittee called upon, as Chairman Patman said, "two distinguished citizens who are in a position to be somewhat aloof from the day-to-day problems . . ."—the eminent engineer and scientist, Dr. Vannevar Bush, and Dr. Edwin G. Nourse, former Chairman, Council of Economic Advisers. Dr. Bush termed as "an exceedingly important problem," raising the caliber of teaching in the elementary and secondary schools. He said: "We have high schools in this country where there isn't a man on the teaching force, or woman, either, who knows anything about science in any of its aspects, and the reason for it is, when we get right down to the basic aspects of it, that we have lost in this country something we had in its early days—great respect for the man of culture who is willing to teach. In even the little red schoolhouse the teacher was a man of the community, regarded highly because he was a scholar. We have lost that, and we do not today give to these men who go into elementary school teaching, and who do a good job there, the recognition that they deserve. It is not merely a matter of money. We don't pay them enough, but we do not give them the standing in the community that we used to give them."

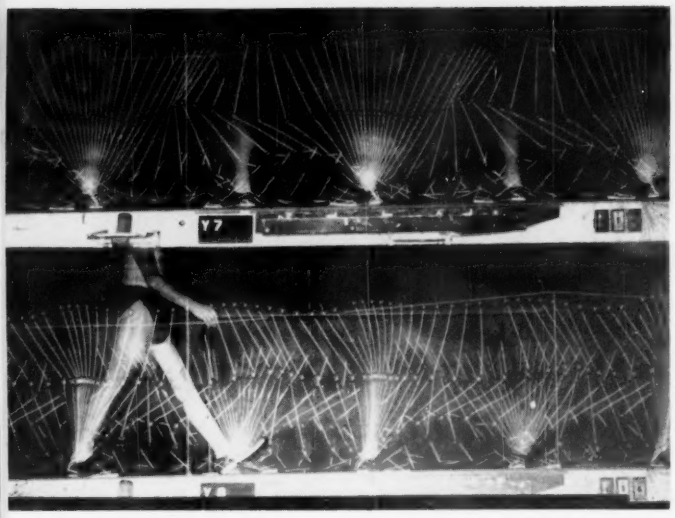
Dr. Vannevar Bush

Dr. Nourse agreed with this comment, but added a point often discussed by professional engineers: " We need not merely to have our rising generation given adequate grounding to become technologists and scientists, but we need them also to be given adequate grounding in the economic and political and social aspects of our society so that they will be able to function intelligently, and, as I said in my paper, tolerantly, in carrying out a free-enterprise system."

This sentiment was in accord with an opinion entered early in the hearing by John Diebold, President, John Diebold & Associates, Inc., former editor of the magazine, "Automatic Control," and author of the book, "Automation, the Advent of the Automatic Factory":

"In the face of existing shortages in the supply of engineers, automation will tend to increase still further the demand for engineers and it may well speed the placement of engineers in more general management positions. This will place a further burden on our educational system. More than ever, engineers must be given the basis for increased social understanding of the business context in which they work. This understanding must be far more thorough and acute than is possible to develop on the basis of the customary 'survey' courses frequently required for engineers in current curricula."

From these very few and brief citations from the 644-page hearing and the Subcommittee's report, it is apparent that the automation hearings were, in a sense, an overall comprehensive critique of the present and prospective state of the engineering profession. It is thus indicated that as automation develops its new promise and problems there will be a lively congressional interest, not only in automation, but, as well, in the engineering profession and its promise and problems.



The engineer's role in medical progress is illustrated by the New York University program of research and evaluation of artificial limbs and other prosthetic devices. Here, for example, is the examination of an artificial leg through interrupted light photographs of the walking pattern of the amputee wearing it.

● *An American Engineer*

Photo Story ●

"Variety" Word For Research At NYU

In Gainesville, Virginia, these days a young housewife is thanking modern research not for a labor-*saver* but for a device that enables her to do *more* work. The device is a light aluminum stepladder with handrails and deep, wide steps.

Tiny, blonde Mrs. Marie Schettini is grateful because the specially-designed ladder permits her to climb up to hang curtains, paint walls, dust remote corners, etc. without anyone's help.

The ladder is another means for her to overcome the handicap that began when she was stricken by polio at the age of five. It gives her a new dimension in keeping "house;" which, in this case is a 16-unit motel she and her husband, also a polio victim, operate.

The Research Division of the New York University College of Engineering designed the device for Mrs. Schettini, not on any formal contract basis but, as the researchers put it, "we found time somehow, between other problems."

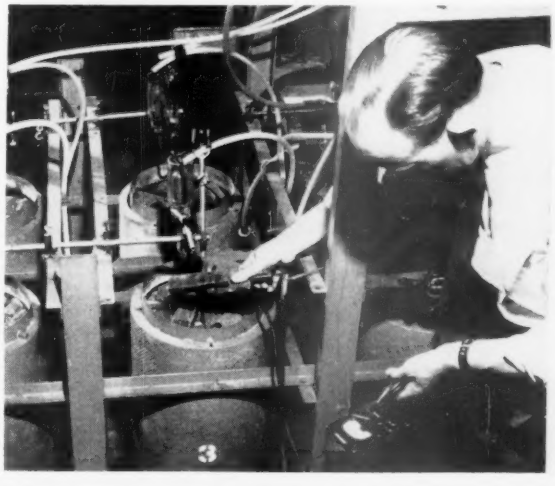
Does this fit into the usual conception of engineering research—huge projects with elaborate facilities, involving thousands of dollars, volumes of reports and decades of man-hours? "It fits," says Dr. Harold K. Work, director of the Engineering Research Division, "if only to remind us of our ultimate goal: contributing to human progress. Like other specialists, engineering scieintists are apt to forget that sooner or later society is the consumer of our efforts."

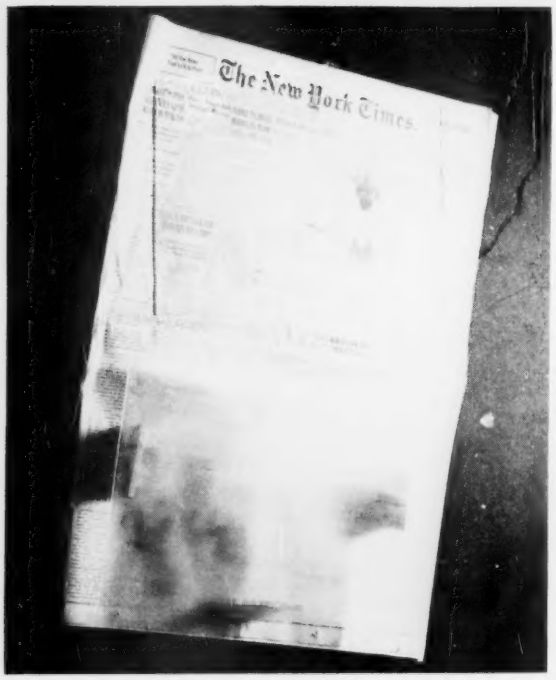
Variety keynotes the research effort at NYU Engineering. One expects to find specialists in the standard engineering fields: aeronautical, civil, electrical, etc. Besides these, however, the research spectrum includes programs cutting across specialized boundaries.

For example, NYU's pioneering effort in experimental

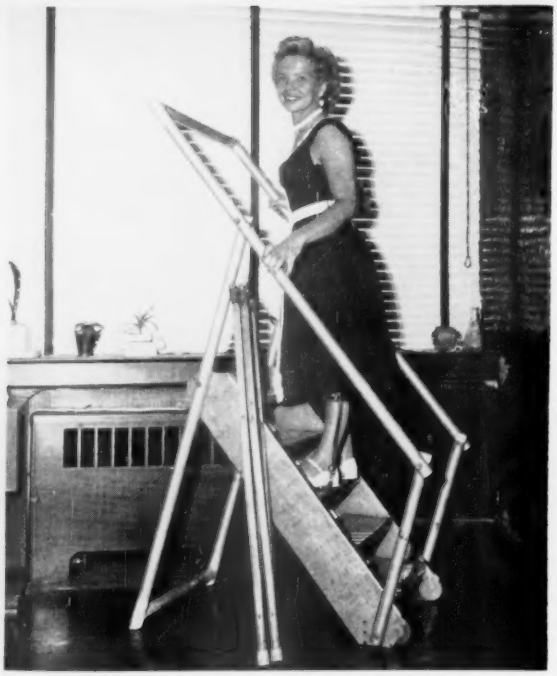
Basic science plays an important role in activity of the NYU College of Engineering Research Division. In 1953, NYU physicists and engineers established a cosmic ray observatory on the top of Mt. Wrangell in Alaska. Note smoke from the crater of the dormant volcano of the 14,006-foot mountain. Mt. Wrangell was northernmost high-altitude observatory ever set up.

In a program sponsored by the Atomic Energy Commission, the problem of removing radioactivity from the wastes of laundries in atomic installations is under study by the Research Division of the NYU College of Engineering. Here, Dr. William E. Dobbins, checks radiation level of experimental trickling filters through which laundry wastes are processed.

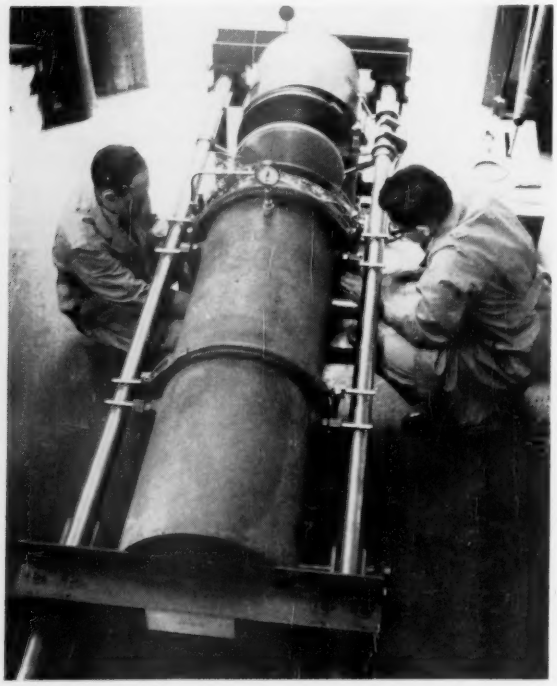




Two panes of glass are coated with a translucent paint developed in the Surface Technology Laboratory of the NYU Engineering Research Division. Paint obscures outsider's view through window, but still admits up to 80 per cent of daylight. Objects more than two inches away are indistinguishable through glass coated with the paint.



A polio victim, Mrs. Marie Schettini, climbs special step-ladder designed for her by the Research Division of the NYU College of Engineering. With handrails, wider steps, and lightness, it permits her to hang curtains, dust remote corners, etc. without anyone's aid.



Nicknamed "Zeus II" after the Greek god who carried thunderbolts in his hand, this device applies sudden loads of predetermined forces to structural materials by means of a carefully controlled simulated explosion. Developed in the Research Division of the New York University College of Engineering, the Impact Tube gives dynamic stress-strain data important to engineers in the design of structures expected to undergo impulsive loading.

air pollution research is the collaboration of aeronautical engineers, meteorologists and sanitary engineers. The aeronautical engineers hit on a novel approach to air pollution research. If the airflow around planes could be studied in a wind tunnel, they said, why not the flow that affects dispersal of fumes from industrial smokestacks?

Helped by the Consolidated Edison Company and the Atomic Energy Commission, they built a low-speed tunnel, the only one in the world built specifically for air pollution research. Since 1948, experiments have been conducted on scale models of existing or proposed new plants of E. I. duPont de Nemours, Esso Standard Oil Co., Kaiser Aluminum and Chemical Corp., the Cleveland Electric Illuminating Company and many others. When the City of Los Angeles' Department of Water & Power had trouble with air pollution problems at the Harbor Steam Plant it looked across the continent for specialized scientific aid.

Biomechanics—sometimes called medical engineering—finds NYU researchers in mechanical and electrical engineering, physics, psychology and physical therapy pooling their know-how. The Prosthetic Devices Group, for example, evaluates every new prosthetic device (replacement for any part of the body) brought before the National Research Council's Advisory Committee on Artificial Limbs and the Veterans Administration.

The group also runs an educational program, setting up clinics in major population centers throughout the country. Also, it does research in design, materials, human locomotion, and instrumentation (the NYU laboratory pioneered techniques of interrupted-light photography).

A SOMEWHAT similar technical umbrella is held over the electron tube industry by the Research Division's secre-

tariat for the Defense Department Advisory Group on Electron Tubes. The group provides a clearing house for the latest information on all Government-sponsored electron tube research and development and runs a trouble-shooting program on tube reliability and applications.

NYU Engineering is in its 101st year. Its Centennial theme—"Teaching and Research Build the Future"—was significant because the Research Division takes on projects with three objectives in mind:

To advance the education of engineering students

To search for and transmit knowledge

To fulfill the obligations of a private university in the public service.

Thus, faculty members play a prominent role on the research staff, and more than half of the full-time research workers are working toward degrees from the bachelor's to the Ph.D.

The Research Division is at NYU's 43-acre University Heights campus, famous for the Hall of Fame for Great Americans. It is interesting to note, incidentally, that two of the three distinguished persons chosen in the 1955 election to the Hall were from science and technology: Wilbur Wright and George Westinghouse.

NYU likes to trace its research interest to another member of the Hall of Fame and to the very foundation of the University in 1832, when the first faculty roster included Professor Samuel F. B. Morse. His experiments in an old University building at Washington Square led to his invention of the telegraph.

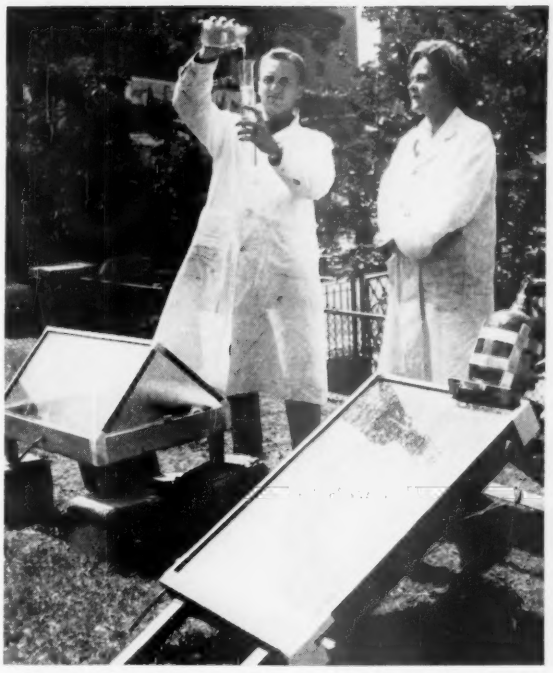
It's not unusual to find an NYU researcher at work in a rowboat, on an Alaskan volcano, or high in an abandoned lighthouse. The rowboat was part of a study by sanitary engineers for the Interstate Sanitation Commission on the problem of pollution of bathing and shellfish areas by wastes discharged from anchored pleasure craft. On the volcano (dormant Mt. Wrangell), physicists studying cosmic rays established the world's nothernmost high-altitude scientific observatory. The lighthouse was used in an NYU study of the accuracy of air-sea horizon photography from aircraft.

How engineering complements the earth sciences was illustrated perfectly when electronic engineers collaborated with Research Division oceanographers to develop an ocean wave analyzer that accurately measures and records on magnetic tape the energies at different frequencies in ocean waves, an instrument valuable in studies of beach erosion, harbor protection, and other aspects of coastal engineering.

TO ASSURE that its research senses and reflects the pulse of current industrial activity, the Research Division has an advisory board of thirty leading industrial research authorities. Heavy experience in industry characterizes many of the key figures in the organization, including Dr. Work himself (at Jones & Laughlin before he came to NYU in 1949). The Engineering Research Division in 1954-55 showed an annual dollar volume of $2,763,000.

Speaking at the Centennial Convocation of the NYU College of Engineering, Dean Thorndike Saville said that perhaps the greatest challenge to the graduating engineer "is the opportunity to prepare himself to be the guiding force, the statesman of science, if you will, to assure health, welfare, and security to the people of the world."

NYU researchers, whether they search for means of harnessing solar energy, seek better methods of taming titanium into a major engineering metal, or work to simplify transistor circuits in the higher frequencies, need look no farther than the University seal for a guiding theme. The motto on that seal reads *Perstare et Praestare* —to persevere and excel.—***End.***



Turning deserts into gardens is the ultimate aim of solar energy research on saline water conversion. A New York University researcher is measuring the fresh water obtained from the new type of solar still, right, as scientist Dr. Maria Telkes observes. Through a process of harnessing the sun's energy for evaporation and condensation (note condensation on window of still), sea and other saline water is converted to water suitable for drinking and irrigation. An older still model is shown at left.

A titanium alloy is melted and homenized from the pure (sponge) metal in a non-consuming electric arc furnace by New York University engineering aide. Under sponsorship of private companies and government agencies, the NYU Engineering Research Division has for eight years pioneered studies in the basic properties and behavior of titanium.

Here's the Story on How One Society Holds Member Interest . . .

Progressing with Our Functional Groups in the Ohio Society

By C. Ramond Hanes, P. E.,

President, Ohio Society of Professional Engineers

OUR society was established for the purpose of advancing the professional, social, ethical and economic status of the engineer. It has a broad concept in administering to the needs of all engineers rather than to a small segment. History is replete with examples of the necessity for an organization representing everyone in a profession, rather than the short-sighted viewpoint where isolated groups seek only to advance their own welfare. The multiplicity of groups has been confusing to the public in our efforts to instill the idea that engineering is a profession—a unified group—rather than a multitude of fragmentary groups.

The professional, ethical and economic phases vary somewhat dependent upon the occupation or calling. This is more true of engineering than any of the other professions. For instance the professional problems of the engineer in industry differ from those of the highway engineer. Or those of the engineer in private practice from those of the engineers with public utilities. Regardless of how these problems may vary in details they have common grounds which must be established in dealing with the public. The desire of fragmentary segments to consider only their own immediate smaller problems without recognizing the far greater long range problems common to all has been responsible for the formation of these groups. Unfortunately, this tendency continues to mushroom as rapidly increasing development leads to more specialization in the engineering field.

In our one society concept, however, it is necessary for us to provide some media whereby these specialized groups may formulate their specific needs in order that they may be presented to the over-all professional group. Along with this need for the analysis and pin-pointing of special problems dealing with special segments of the engineering profession is the recognition of the need for these problems to be coordinated and presented by the over-all professional body.

It was just such a need as this which resulted in the first Functional Group being formed as a part of the Ohio Society of Professional Engineers in 1939. Prior to that

Shown in progress is a meeting of Ohio's Industry Functional Group at Akron, with Dale D. Streid, manager of Engineering Jet Engine Division of GE, Cincinnati, addressing the group.

Meeting of those interested in forming Education Functional Group of Ohio Society. Speaking at the table is Paul Harlamert, past president of the Ohio SPE (hand raised).

time a portion of the annual meeting had been allocated to meetings for groups having common technical interests. This was a development or hold-over from the original Ohio Engineering Society which preceded our present Ohio Society of Professional Engineers.

WITH the changeover to a professional society dealing with professional problems, it soon became apparent it was necessary for provision to be made for discussion of the problems common to each particular group. A special committee was named to study the problem and make recommendations for action. This study gave consideration to the fact that the committee plan did not provide as broad an operational base as necessary for this purpose. The study developed the idea that these groups desired more individuality than was associated with the ordinary committee concept, and eventually the Functional Group plan was evolved.

The term *Functional* was chosen as being descriptive of the idea—pertaining to or performing a function.

The OSPE Constitution was changed to provide that "upon written petition of a reasonable percentage of voting members having common professional problems and interests, the Board may grant permission to such Functional Groups to organize and operate under the Constitution and Bylaws of the Ohio Society. The chairmen of Functional Groups shall be members of the Board."

The Bylaws under which the groups operate are as follows:

Bylaw 5—Functional Groups

A. The Functional Groups shall be so conducted as to provide effective forums for discussion and united action on the part of members grouped according to type of professional employment, for the enhancement and betterment of professional recognition and status, conditions of employment and other matters of common welfare.

B. Membership in any Functional Group shall be open to any member of the Ohio Society having common professional problems and interest with the group.

C. The officers of each Functional Group shall consist of a Chairman, four Vice-Chairmen and a Secretary-Treasurer. Officers shall be elected by the Group Membership at a general Group meeting held at the time of the Annual Convention, and shall hold office for a period of one year. The Vice-Chairmen shall be selected to provide a geographical representation.

Officers shall assume the duties usually performed by officers in the same positions, subject to rules which may be adopted by the Group and approved by the Board of Trustees. Priority of succession of Vice-Chairmen to the Chairman's duties, in case of need therefor, shall be determinated by means satisfactory to the Group.

Ohio's Private Practice Functional Group in session. At left in front row is shown the main speaker of the affair, Consulting Engineer Frederick H. McDonald of Charleston, North Carolina.

D. The officers shall constitute the Executive Committee of the Group. The Executive Committee shall establish and maintain contact with similar Functional Groups in the various Chapters and shall conduct the business and activities of the Group during the time between general meetings and shall make necessary arrangements for the general meetings.

E. Each Functional Group shall hold at least one general meeting each year at the time and place of the Annual Convention of the Ohio Society. The Executive Committee shall hold at least one meeting each year in addition to the Annual Convention meeting. Meetings of the Executive Committee shall be open to the Group Membership.

F. When considered necessary for promoting or forwarding its special purposes, any Functional Group may establish a fund for that purpose. Sources of such funds may be donations from the Group Membership, or other sources approved by the Board of Trustees. No Group shall impose dues or assessments upon its members, payment of which shall be a condition of membership in the Group. The treasurer of the Ohio Society shall be the custodian of all Functional Group funds and expenditures therefrom shall be subject to the approval and audit of the Board of Trustees.

G. Minutes shall be kept of all meetings of Functional Groups and of their Executive Committees and copies thereof shall be filed in the Society office as soon as possible after the close of such meetings.

H. The Board may dissolve any Functional Group at a meeting called for that purpose.

THE original Functional Group which was formed under this provision was the Highway Engineers. The groups have now grown to a total of seven as follows:

County
Education
Highway
Industry
Municipal
Private Practice
Public Utilities

The most recent, which was authorized during the past year, is Education.

Space does not permit following through with the development of each of these groups to show the accomplishments which have been possible or the work presently under way. A few illustrations, however, would demonstrate the possibilities of our Functional Group plan.

For instance, from the first Highway Functional Group meeting recommendations were made to the Trustees of the Ohio Society and favorably acted upon resulting in cooperation of the Ohio Society with legislative study committees, the State Highway Department and the State Civil Service Commission, from which eventually a comprehensive salary scale was established for the engineering group. Since that initial study other follow-up recommendations have been made resulting in improving the economic status of the highway engineer. These recommendations were those of the Ohio Society of Professional Engineers and as such carried much more weight than if they had been made by a group of highway engineers.

The Private Practice Functional Group has been active on so many fronts it is difficult to select any one thing and say it is the most outstanding illustration. One very worthy project was the development of a Code of Professional Practice. This was first adopted in 1941, revised in 1947 and again in 1954. This also includes fee schedules for engineering services which have been revised four times since their original adoption; short form of agreement between owner and engineer for professional services; standard form of agreement between owner and engineer for professional services; Canons of Ethics for Engineers and Rules of Ethical Practice. These codes have been distributed to all public bodies in Ohio to guide them in their dealings with engineers.

The Private Practice Functional Group has also taken steps to eliminate competitive and alternate bidding for engineering services.

All of these activities have been directed to the Trustees of the Ohio Society with the final action by the Ohio Society in presenting the material to the public. Our Private Practice Functional Group has been the most active of any of our groups. In this respect we have pointed to their accomplishments in alerting our other groups to activities which they could and should be pursuing.

ORIGINALLY the Functional Group plan was established for operation largely at the annual meeting time. That continues to be the principal occasion when the entire group is given the opportunity of meeting and discussing their problems.

We found this had certain undesirable features, however, in that some of the group officers initially considered their prime purpose was only to get a convention program together. The concept has, therefore, changed as we have progressed with the development of the groups.

Now the chairman of each Functional Group is requested to appear before the Executive Committee early in the year to discuss proposed plans. The Executive Committees of these groups, consisting of their officers, are scheduled for meetings at least four times during the year other than convention time. These meetings are generally immediately preceding our Board of Trustees meetings which permits consideration of any action which they may wish to recommend to the Board.

Our Private Practice Functional Group Executive Committee has scheduled meetings every month with intermediate meetings of subcommittees as often as weekly to coordinate their activities during the current year.

To supplement the annual convention-time meetings, during the current administrative year we called a Workshop Conference of these groups during one afternoon of our annual outing at Camp Muskingum. We found the informal atmosphere generated at a meeting of this nature to be very beneficial in developing some constructive ideas for our Functional Groups. For the first portion of the Workshop, all of the groups assembled for discussion of mutual problems. The second portion was occupied with individual Functional Group meetings where only the problems of particular interest to each group were considered. The idea was successful to a gratifying degree since all of the members present at the camp were interested in some particular group and thus had a reason to participate in the meetings.

WE have also started a membership approach through our Functional Groups. We consider this one of our best approaches since engineers with common professional problems will be associated quite closely in their everyday lines of endeavor. This affords an ideal opportunity for invitation to membership. This also provides a focal point through which the discussions of large groups of engineers associated in some industry may be transmitted for study and recommended action.

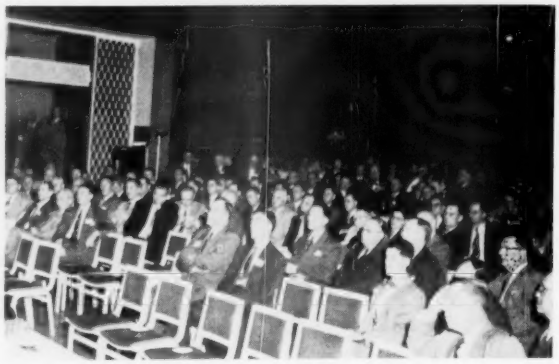
The Ohio Society of Professional Engineers has operated for a number of years with committees being assigned to the President and three Vice Presidents for coordination and guidance. In this over-all scheme of operation the Functional Groups have recently been designated as working under the President. We consider this to be a desirable method of operation so the President may have a close knowledge of the activities of each of the groups which we consider to be so vital in the successful operation of our society.

AS previously stated, originally our Functional Group plan was established for operation principally at the annual meeting. This has changed, however, as it became increasingly apparent the groups had work to be done throughout the year. Whatever the item or action they are considering, it is necessary that it be a recommended action to the Board of Trustees. After action by the Board of Trustees it is an action of the entire Society rather than a small group. The chairman of the Functional Group is a member of the Board of Trustees and thus is in a position to bring matters before the Board for consideration.

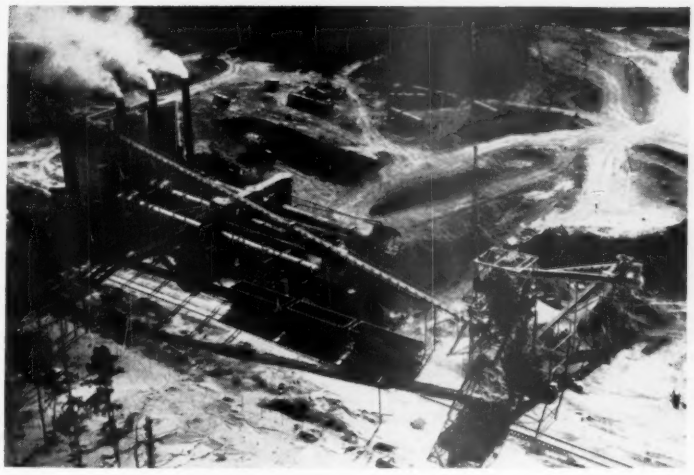
Initially our Functional Group plan of operation was designed for state level only. As we have progressed through the years it has become increasingly apparent it is also necessary to have some comparable approach at chapter level as well. This has been done in some of our larger chapters by having a Functional Group Director representing each of our authorized Functional Groups as a member of their Boards of Directors. Some chapters have committees corresponding to our state-level Functional Groups, or at least some of the groups. Whatever the local chapter vehicle, we have learned by experience it is necessary to have some means of transmitting the Functional Group concept to the chapters.

THE problem of just how this Functional Group representation may best be carried on at chapter level is now being studied by our Past Presidents Committee on Professional Development. We know from this study definite recommendations will be made to accomplish the desired results. The plan will not necessarily be confined to a single method but will probably vary with the size of the chapter. This is understandable as our chapters vary from 25 to 900 members in size and from strictly rural to highly industrialized chapters.

In chapters where some form of Functional Group representation has been established, they have recognized the program possibilities in having a particular group responsible for a program. In emphasizing the professional problems associated with each of these groups, or at least groups of major interest such as industry, the



More than 250 of the Highway Functional Group of the Ohio SPE hear the state's Director of Highways S. O. Linzell. Engineer Linzell is a member of the Franklin County Chapter, OSPE.



Engineers with mutual interests, such as those working in industry, find functional groups a vital part of their professional society. The NSPE Board of Directors has approved the principle of the groups and commends them to the affiliated state societies of the national organization.

entire chapter membership thus has an opportunity to become better informed.

When our Functional Group plan was first initiated, a fear was expressed by some that the groups might become too strong and thus overshadow the parent organization. We know, of course, most of the things we fear never happen, which was true in this instance; and after sixteen years of operation, we now recognize we should have been more fearful if we had not made provision for the groups to function. We can look about us and see evidence that if we had not proceeded as we did at that time our members would have been dissatisfied in not having a group through which their particular views relating to professional, ethical and economic values might be formulated. They would have considered it necessary to segregate themselves from the professional society and form a "splinter group" such as President Allison C. Neff discussed in his article in the October 1955 AMERICAN ENGINEER. These are the real trends to be feared and guarded against. The Functional Groups provide a media whereby the special interests may be recognized—retaining essential individuality while at the same time being a part of an over-all team.

We know the Functional Group plan of operation has an even greater potential than we in Ohio have demonstrated is possible thus far. We are very pleased in Ohio, that NSPE Directors have recently approved the Functional Group plan in principle. We are pleased because we know many other states will benefit; and, further, it is a challenge to Ohio to step up and improve our Functional Group method of operation.

It is necessary in this operation as it is in all others to continually re-examine our position to make sure we keep abreast of changing conditions. We must be alert to recognize the need for changes and anticipate the need rather than fail to do something and later regret the oversight.

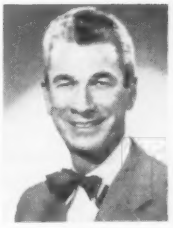
IN examining the possibility of the Functional Group type of operation we believe the time is not too far distant when the Ohio Society will have an executive secretary or executive director on a full-time basis to look after and coordinate the efforts of some of the groups. The only limit to the possibilities for positive action under this method of operation is the lack of vision on our part in being alert to adapting ourselves to ever-changing conditions. The fact we have been content to operate in a certain fashion last year is not a reason for continuing in the same manner today.

We have agreed in Ohio that many of the things we should and could be doing through our professional society should originate at our Functional Group level. The potential is there, it merely needs to be recognized and carried into action.

To paraphrase President Neff's words, let us apply the lessons taught us by history and be alert in providing the working tools for our enginners through our professional society. Anything which needs to be done by any engineering group in looking after the professional, ethical, and economic development of the engineer can be done through the Functional Group type of operation in our professional society—and, furthermore, these things may be accomplished in a more positive manner by our acting as a unified profession.

Let us be more alert in emulating the example of our sister professions in strengthening our over-all professional body, for in this as all other matters—in unity there is strength.—***End.***

About the Author . . .



C. Ramond Hanes

C. Ramond Hanes, president of the Ohio Society of Professional Engineers, is a structural engineer with the Bureau of Construction of the Ohio State Highway Department in Columbus.

He earned his civil engineering degree at Ohio State University in 1924. After a brief period in industry and private practice, he joined the Highway Department in 1928. He is a recipient of the 25-year Meritorious Service Award of the American Association of State Highway Officials.

Noted for his interest in professional activities, Mr. Hanes was the first president of the Maumee Valley SPE, a chapter of the Ohio Society; and he has served the state organization as treasurer, vice president, and trustee, in addition to holding his present office. He has also been president of the North West Ohio County Engineers Association. He is a member of Tau Beta Pi and Theta Tau.

Here are the Missouri planners. Standing left to right: D. L. Robinson, Irvin Coyle, Don A. Fischer, and Paul N. Doll. Seated around table left to right: H. L. Ferguson, H. P. Wardlaw, H. K. Kirchner, A. C. Kirkwood, Hubert Wheeler, H. J. Bruegging, O. Spurgeon, H. O. Croft, and C. L. Wilson.

Action in Missouri . . .

Missouri SPE Joins with Educators To Extend Math, Science Courses

A plan to extend mathematics and basic science courses in Missouri high schools was discussed at a joint meeting held recently by staff members of the Missouri State Department of Education and officials of the Missouri Society of Professional Engineers.

A long range look was taken at this problem and although spectacular results are not expected immediately in the "Show Me" state, there are several things that should be done to help this expansion program. However, immeasurable results are expected in the first year.

It was pointed out that five things should be done immediately by the Missouri Society of Professional Engineers as soon as convenient to do so, which are:

1. Assist in Missouri's high school counseling program to bring high school counselors up to date on the needs for improved pre-college engineering curricula.

2. Provide the Department of Education with statistics on the need for more trained engineers.

3. Help local school officials locate good mathematics and basic science teachers.

4. Publicize National Engineers' Week through high schools.

5. Prepare articles affecting this program for the *Missouri Teacher*, a monthly publication going to 30,000 Missouri school teachers.

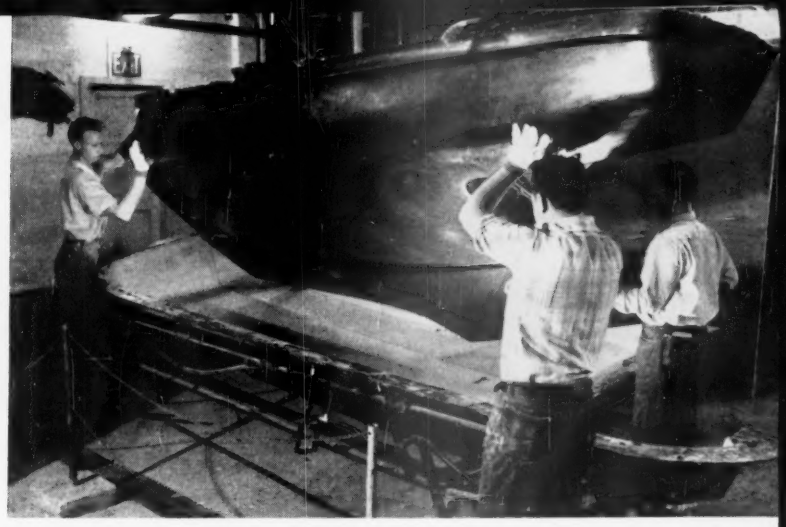
The State Department of Education staff members agreed that there were several things they should be doing to help this program. Their responsibilities are to cooperate where possible in the above five points. They will help obtain space for articles in the *Missouri Teacher*. They will help publicize National Engineers' Week through their literature. They will use up-to-date information made available to them on the shortage of trained engineers.

The meeting was so gratifying that the group unanimously agreed to hold another session in about six months for the purpose of reviewing progress and following through on the above recommendations. Additional things to do will be presented as this program in Missouri develops.

It was pointed out that Missouri is one of twenty-four states in America now requiring one unit of mathematics and one unit of basic science for accredited high school graduation. No states require more than one unit of math and one unit of science. Mathematics is not required for high school graduation in twenty-four states. Although it is not expected that the requirement for high school graduation in Missouri will be increased, it is believed that there can be much improvement in mathematics and science curricula above minimum requirements. Of special concern was the significance of counseling high school freshmen. This particular group of students should have reliable facts presented to them by their high school counselors about the engineering profession and pre-college scholastic requirements.

PRESENT at the Missouri meeting were: H. O. Croft, Dean, College of Engineering, University of Missouri; Curtis L. Wilson, Dean, Missouri School of Mines and Metallurgy; Don A. Fischer, Dean, College of Engineering, Washington University; and the following MSPE officials—H. J. Bruegging, President; A. C. Kirkwood, President-elect; H. L. Ferguson, Secretary; D. L. Robinson, Treasurer; and Paul N. Doll, Executive Secretary.

Representing the Missouri State Department of Education were: Hubert Wheeler, Commissioner; H. P. Wardlaw, Assistant Commissioner; H. K. Kirchner, Assistant Commissioner; O. W. Spurgeon, Director, Secondary Education; and Irvin Coyle, Director, Teachers' Certification.—***End.***



Here is a durable but lightweight reinforced plastic piece of a truck roof being removed from a mold.

P. E.'s At Work . .

Reinforced Plastics: New Engineering Challenge

BY

JAMES S. LUNN

President, Lunn Laminates, Inc.

Mold for curved roof of United Parcel Service truck being prepared by waxing.

FIBERGLASS reinforced plastics are about twelve years old. They were developed by professional engineers during World War II for the fabrication of "flak resistant" aircraft fuel tank compartment liners and electronically transparent radomes. From this dramatic beginning and despite high strength-to-weight ratios, great impact resistance and excellent electrical properties, the use of "FRP" dropped to a trickle in the post-war period. Military utilization was drastically curtailed, and new commercial markets were hard to find.

Since then the use of FRP has climbed steadily but slowly.

Regardless of its slow growth, everyone now seems to agree that thermo-setting reinforced plastics are going places. This optimism is apparent for a number of reasons; here are several:

1. The stock market has steadily reflected the confidence of its investors. The investing public is aware that FRP is a sound *long-term* growth industry. Recent private and public financing in the industry demonstrate that inexpensive sources of new capital are readily available for expansion needs.
2. The large number of prominent firms now supplying polyester and epoxy resins and fibrous glass indicate the faith that long-established manufacturers have in the future of FRP. Shell Chemical, Union Carbide and Carbon, Allied Chemical and Dye, American Cyanamid, Minnesota Mining and Manufacturing, Owens-Corning and Pittsburgh Plate Glass are a few of several score "giants" tied to the industry.
3. The public acceptance of FRP in the small boat

Spraying of gelcoat on three parts in one mold: gas neck cover, attachment flange and rear door frame. The lamps in front and rear of operator are only for illumination. This is a standard spray booth designed by engineers at Lunn Laminates, Inc.

held, fishing rods, do-it-yourself corrugated sheet, thousands of sport car bodies and truck bodies is additional proof.

4. Of great importance, too, is the ever-increasing dependence of the armed services on FRP. Aircraft fuselages, giant radomes, large and small landing craft and guided missiles are examples.

FRP are currently used for about 70 million pounds of finished goods per year. The growth of FRP has been delayed . . . because it is a new *structural* material. *FRP must be engineered.* And it differs in major respects from commonly used structural materials such as wood, steel and aluminum.

A major difference is strength. Much has been said by engineers about the superior strength of reinforced plastics. But there are many combinations of fiberglass with resins, and broad comparisons cannot be truly accurate. Strength characteristics of typical FRP laminates using general purpose polyester resins are given below.

Property	Cloth Laminate Style 181	Chopped Strand Mat	Parallel Roving (Rod Stock)
Specific gravity	1.7 to 1.9	1.5 to 1.6	1.7 to 1.9
Glass content % by weight	60 to 65	35 to 45	50 to 70
Tension psi (000)	40 to 48	15 to 23	80 to 130
Flexure psi (000)	50 to 60	25 to 38	100 to 200
Compression psi (000)	30 to 38	18 to 26	50 to 75
Shear psi (000)	16 to 23	12 to 17	
Bearing psi (000)	40 to 65	28 to 40	
Impact ft. lbs. in.	20 to 27	13 to 21	50 to 70

FRP possess other hard-to-find properties. Problems of chemical resistance, weathering, temperature resistance, thermal conductivity and electrical properties may be engineered by various combinations of resins, fillers, glass fibers and pressure in manufacture. Chemical resistance of an FRP structure is mainly based on the resins used. Extensive immersion tests in a 30 per cent solution of sulphuric acid show that FRP retains 85 per cent of flexural strength. Generally, polyester and epoxy laminates may be said to be resistant to common acids and most solvents. Alkali resistance of resins is still a problem but the manufacturers are working to improve their products in this respect and some of the newest resins show marked improvement.

THE resin and glass also dictate electrical characteristics. In looking for electrical insulating materials, designers and engineers are concerned with dielectric loss, dielectric breakdown and insulating resistance. The importance of these properties depends upon the application, but dielectric breakdown is almost always the deciding factor in choosing a material. Proper engineering can produce laminated plastics to meet rigid electrical requirements.

Temperature resistance in structural materials is another area of concern to engineers. FRP actually exhibit higher strength at subzero temperatures. Airborne radomes and aircraft structural parts carried into the frigid conditions of the stratosphere are examples where this phenomenom may be observed. When certain RP laminates become hot, their maximum service strength of 250° is demonstrated. Special polyester/glass laminates retain good strength characteristics up to 500° F. Continued research by resin manufacturers points toward further improvement in temperature resistance.

Investigation of the ultimate strength versus temperature curves for various aluminum alloys shows that a sharp decrease in the ultimate strength properties of these alloys exists with increased temperatures. It is seen that at temperatures around 300°F, the ultimate strength is 56 per cent, and at a temperature of 500°F the percentage has dropped to 18 per cent. By comparison, reinforced glass cloth laminates can be molded with the use of improved high-temperature resins that show a ratio of ultimate strength of 95 per cent at 300°F and 87 per cent at

Sub-assembly of entire cab for this truck consisting of four parts is done on separate jig. It is placed on truck as one unit. Remaining parts to be added are fenders, windows, doors, and glass for windows and doors.

This view of the UPS delivery truck components shows all the twenty-two molded pieces. Because the radiator grill was not finished and trimmed as yet, it appears slightly white. Headlight holes have not been cut out as yet.

500°F. Thus, for an application requiring strength at elevated temperatures, the weight-strength ratio is greatly magnified when the strength characteristics at the higher degree temperatures are considered.

Thermal conductivity is dependent upon the glass-to-resin ratio of the laminate, together with the direction of the fiberglass. A good heat insulator, the thermal conductivity of a glass mat laminate is approximately .001 (one thousandth) that of aluminum. The conductivity of steel is about 250 times greater than a mat laminate. It is interesting to observe that plastic truck bodies and cabs feel warmer in the winter and pleasingly cool in July.

Bearing and shear stresses in metals are seldom considered at length by designers. It's not necessary. However, these stresses may be critical in the designing of RP structures. These conditions dictate the need for thorough engineering where bearing and shear factors are to be called upon. The same is true in flexural problems. They must be carefully considered in engineering FRP whereas with metals their problem is seldom critical.

DESIGN flexibility in reinforced plastics offers broad horizons to professional engineers. It is in this area where engineering skills are needed to take full advantage of its superior characteristics. The design flexibility of RP makes it a structural material with no equal. Strength may actually be put in the direction wanted. Strength may be omitted where not needed. What other material lends itself so readily to newness of design and weight saving? *What other material can match this engineering challenge?*

To a surprising extent, the shape of most articles is dictated by the form of the material from which it is made. Steel, aluminum, wood and most other structural materials are produced in flat sheets, bars, or straight lengths. Compound curves are difficult to obtain. Most structures have curvature only in a single direction . . . and, if double curvature is required in "old fashioned" structural materials, it is usually done at a high cost. The feasibility of fabrication of reinforced plastics of curved structures or shell structures is indicated by a number of reasons:

(1) Relatively low die costs as compared with dies for forming metals.
(2) Lack of stress concentrations built up in the material when formed.
(3) Simplicity of molding large, one piece, compound curved shell structures.
(4) Ease of molding in local reinforcements as dictated by engineering.

By taking advantage of reinforced plastics' ease of moldability, alert engineers are designing high-performance, compound-curved structures seldom attempted previously. We in the reinforced plastics industry like compound curves. We like large-sized structures that are difficult to design and construct in one piece in other materials. The ease of moldability is a major asset in this new industry. However, this ease of moldability does not make it a "cinch" to fabricate a good product. The making of a *good* FRP part is extremely difficult, requiring complete skills in production know-how, design and engineering.

Fiberglass reinforced plastics are going places. But, there is a need for new, creative engineering . . . by engineers with courageous but sound originality.—***End.***

About the Author . . .

James S. Lunn

James S. Lunn, president of Lunn Laminates, Inc., Huntington Station, Long Island, one of the pioneer companies in the reinforced plastics industry, is a graduate of West Point Military Academy. He was a lieutenant colonel in the Army of the United States during World War II. In 1946, he became a partner in, and later became owner of, Low & Preston Co., the forerunner of Lunn Laminates.

Mr. Lunn is known for his early work in the application of reinforced plastics for aircraft structural parts, radome development and, more recently, in the production of the first reinforced plastics-bodied sports cars, truck bodies and cabs.

Mr. Lunn has also had extensive experience as a sales engineer, real estate appraiser, and as an executive in advertising and sales promotion. He is a member of the Society of the Plastics Industry, the American Ordnance Association, the National Aeronautical Association, the Small Business Association, the Empire State Chamber of Commerce, and the Industrial Council of the Long Island Association.

N.S.P.E.

Believes

THE IMPORTANCE OF MEMBERSHIP

BY PAUL H. ROBBINS, P.E.

Executive Director

N.S.P.E.

As we start this New Year, it behooves us as individuals and as a Society to take stock of our membership activities. Too often, in chapters and state societies members feel it is only the responsibility of the Membership Committee and the officers to be concerned about membership and the growth of the Society. The year 1955 has shown a most encouraging growth. At year's end, the total membership shows an increase over a similar date in 1954 of nearly 3,000 members. This is indeed encouraging; but when members stop to consider the many problems of both the Society and the profession which could be solved if even 50 per cent of the registered engineers were actively supporting the professional programs of NSPE, the importance of renewed membership activity becomes apparent.

NSPE believes increase in membership is important for many reasons. First, it makes the Society more effective on a number of points. As a representative of the registered engineers of the Nation, it becomes a more influential voice in expressing their opinion on important subjects. With greater participation, an opportunity is provided more and more engineers to develop the programs and policies best suited to the improvement of the engineering profession. More members mean more active chapters and state societies. The more active and aggressive each level of the professional society becomes, the more improved is the status of the entire profession. More eager hands are willing to pick up the load; more attention is given to pressing problems of the profession; better financing is available to attack each of the many problems needing attention.

As we come to the end of the NSPE fiscal year, a constitutional provision automatically goes into effect, which provides that those members of the Society who have not paid their dues during the calendar year shall be dropped from the mailing list. The mailing list for the January AMERICAN ENGINEER, of course, has to be run prior to December 31; and, so, each of these members will be receiving this issue of the magazine. It is encouraging to note that the percentage of members in this category has been decreasing for the last several years, and this year even fewer of the members than last year will be denied subsequent mailings.

It has been truthfully said that the life-blood of any organization is its membership. There are three types of members in any organization: (1) the stalwarts, who support the Society in all its activities with their time, energy, and money; (2) the new members, who have perhaps just become acquainted with the programs of the Society, or who, for one reason or another, have only recently taken the steps to join; and (3) the inactive members, who have lost contact and interest in the Society's activities. It is in this last group, of course, that those who have not paid their last year's dues fall. NSPE believes it is equally important to retain the old members as it is to get new members.

It would be well if informed members of the Society could talk with each registered engineer who desires more information about the Society. Unfortunately this is not possible, and so we must resort to the printed word. From the National Society there are a number of excellent publications which are helpful, including: *Every Man a Debtor*, the basic publication of NSPE explaining the philosophy of organization of the professional society, and the *Annual Report* recently mailed to all members of the Society, outlining the activity of the administrative year 1954-55. It is recognized that many members of the Society will wish to keep this *Annual Report*, but there will be those who, having read it, will have no occasion for further reference. It is urged that those in this latter category not throw the *Annual Report* away, but put it in an envelope and mail it to some engineer who is known not currently to be informed on all of NSPE's programs.

Much additional literature of NSPE may be of particular interest to individual engineers. Each state society has a supply of this material, as do the officers of each chapter. Most state societies have additional literature, outlining activities and programs of the state society, which supplement the national programs. NSPE believes strongly, however, that this material should never be expected to supplant the personal invitation to the friend or business associate to avail himself of the opportunities provided by membership in the society. If each member would have in his pocket a membership application and would make himself responsible for getting at least one additional member for the Society in 1956, each of our local chapters, our state societies and the national organization would double in membership in the next calendar year. The activities, the opportunities, and the good for the engineering profession which would result challenge the imagination.—***End.***

An *American Engineer* SPECIAL REPORT

Re: Education and Soviet Professional Manpower

● "Reduced to its fundamentals, Soviet educational philosophy rests on three major premises. The first of these is that the advancement of science and technology is best promoted through the central planning of education and research. The second is that scientific and educational efforts are primarily a means for the advancement of the social, economic, political, and military interests of the nation. The third is that the basic truths of human life, of nature and of the universe, and of social, political, and economic reality, have been discovered and proclaimed and are beyond debate, so that the task of the teacher and of the scholar is to demonstrate and to apply these truths rather than to question them or to seek alternative truths."

The above is a statement from the new book, "Soviet Professional Manpower — Its Education, Training, and Supply," prepared by Nicholas DeWitt of the Russian Research Center, Harvard University, and published by the National Science Foundation in cooperation with the National Academy of Sciences—National Research Council. The general basis of the book is a comprehensive study of the Russian educational system, for which statistics and data assembled from various sources over the years seem to be quite meaningful, with only relatively minor evidence of statistics juggling or ambiguity of presentation in certain instances to cover some unfavorable trends. It is a publication that will be of major interest to engineers and to all those concerned with the problem of the current technological manpower "contest" with the U.S.S.R.

APPROXIMATE DISTRIBUTION OF SOVIET ENGINEERING STUDENTS, BY FIELD OF STUDY, IN 1950

Fields of study	Per cent of total engineering students in the field
Aeronautical engineering	3-5
Chemical engineering	12-14
Civil engineering	10-12
Electrical and power engineering	12-14
Engineering economics and management[1]	8-10
Mechanical engineering	28-32
Mining, geological, metallurgical engineering	12-14
Other[2]	6-8

[1] This specialty is not known in American engineering education and, strictly speaking, is only peripheral to the engineering field.

[2] This group contains some fields (like meteorology, navigation, etc.) which are excluded from engineering in American reporting.

So much information of importance is included in the book that it is difficult, and in a way impossible, to prepare a digest of the material without omitting considerable data that is of prime significance. The scope of the work is even a bit wider than the title indicates since all phases of Soviet education—even those producing other than strictly "professional" people—are considered, and the review begins with the pre-school and primary educational opportunities available in the Soviet Union.

Perhaps one of the most common misconceptions that the book dissolves is the idea that everyone gets the same basic education in Russia from preschool days onward. This simply is not the case. To begin with, there just are not enough nursery schools to go around, and only the minority begin their education in this way. What is more, while Soviet propaganda claims that every Soviet citizen has a right to education and to the limitless development of his intellectual capacity, what actually happens is that a careful policy of selection operates "to give extensive education to a few of the finest and limited education to the many." Education in rural areas, for instance, is far inferior to urban standards, and Soviet labor drafts most frequently draw upon poorly schooled and skilled rural youths.

The pace of schoolwork in the Soviet 10-year school, from which, incidentally come the majority who go on to engineering and scientific training, is extremely rigorous and the less-talented are dropped by the wayside and their abilities channeled into the nonprofessional areas with far less concern about their deprivation of opportunities than under any democratic system with its dedication to the development of the individual. In the Soviet system, opportunities are not made for the in-

dividual; the requirements of the state are determined, and those who have the talent to fit them will find it to their advantage to do so.

Thus there is, as all the daily newspapers report, maximum emphasis on technological education in Russia. And there is also maximum competition among the students for the opportunity to enter the technological and scientific field, because there is no question that persons pre-eminent in this area also achieve many special privileges of an elite class. However, once a person's efforts have been channeled into and his training has been set in a particular field, there is little chance that he will ever have the opportunity to change his mind about his life's work.

One feature of the Soviet educational system that is particularly noteworthy is the emphasis on the "technicum," or technical school, where formal training is given in many of the semi-professional skills which American workers more frequently learn through on-the-job experience. "Originally," reports the author, "formally trained semi-professionals were singled out as a group because of their relative scarcity. Then, as training expanded and was improved, a certificate indicating completion of specialized semi-professional education began to command prestige, pay differentials, particular status, and advantages for promotion, because of the great need for people with such training. Various regulations were issued to facilitate the singling out of trained semi-professionals as a unique group, and their importance, in a formal sense, began to be stressed to a much greater extent than in our economic system."

PLANNED RELATIONSHIP OF ENGINEERING-TECHNICAL PERSONNEL TO PRODUCTION WORKERS IN DIFFERENT INDUSTRIES IN 1950

	Ratio per 1,000 production workers			
Branch of Soviet industry	Trained engineers with completed higher education	Trained technicians with secondary specialized education	Practicals	Total engineering technical personnel
Electric power stations	50	115	20	185
All types of machine building	45	90	20	155
Petroleum industry	40	85	25	150
Chemical industry	35	80	25	140
Metallurgical industry	25	55	35	115
Food industry	20	55	35	110
Coal and peat industry	20	40	45	105
Construction materials industry	15	40	35	90
Textile and light industry	15	35	30	80
In all branches	28	60	30	118

Extensive consideration is also given in the report to the education of the engineers who form the backbone of the new Soviet technology. Among the many interesting points noted is the fact that a far greater percentage of Soviet students train in mechanical engineering than do engineering students in the United States.

Also, not so much emphasis is given to the advanced degree for the beginner engineer, such degrees may be earned in research institutes as well as in establishments for higher education; and thus they are frequently considered more as marks of past achievements than as prerequisites for future work. The advanced degree is not regarded as indispensable as a qualification for academic appointment.

In addition to education itself, of course, impressive gains in the utilization of this educated professional manpower have been made by the Soviets in the last twenty-five years. A not inconsiderable factor in this advance has been the utilization of womanpower, since women now constitute approximately 50 per cent of the U.S.S.R.'s professional manpower base.

We must bear in mind, the author concludes, that as a result of the Soviet Union's efforts in building up its specialized manpower resources, it has "reached a position of close equivalence with or even slight numerical supremacy over the United States as far as the supply of trained manpower in specialized professional fields is concerned. The Soviet effort continues. Our own policies in the field of education and in regard to specialized manpower resources will decide whether within the next decade or so the scales will be tipped off balance."

Several charts from this impressive text are produced with this brief review. For a complete appreciation, however, of the full impact of Soviet professional manpower as interpreted by Mr. DeWitt, it can only be recommended that the book be studied in toto.

NSPE Airs Views on Wage-Hour Professional Exemption Regulations

Statement of NSPE to Administrator, Wage & Hour Division, U. S. Department of Labor.

RE: Revisions to Regulations, Part 541, Fair Labor Standards Act, Defining and Delimiting the terms, "Any Employee Employed in a Bona Fide Executive Administrative, Professional or Local Retailing Capacity, or in the Capacity of an Outside Salesman."

My name is Paul H. Robbins. I am the Executive Director of the National Society of Professional Engineers and appear at this hearing to present the Society's views . . .

Before proceeding with the discussion of our two points, we would point out for the record that the National Society of Professional Engineers recognizes as one of its major responsibilities the advancement of the economic interests of professional engineers. This duty is stated in our Constitutional "Objectives," along with the advancement of the public welfare and the promotion of the professional and social interests of professional engineers.

Minimum Salary Requirement to Qualify for Professional Exemption Under the Regulations

The official policy of the National Society of Professional Engineers, as approved by its Board of Directors, is stated in full as follows:

"The Federal Wage-Hour Law has, from its inception, excluded professional employees from the minimum wage and overtime provisions. The theory of the exclusion has been based on a recognition of the unique nature of professional services, in that professional duties require flexibility in terms of hours worked and that in such circumstances it is not practical or equitable to bring professional employees into the same rigidity of employment conditions which may apply to those working under conditions susceptible of standardization of hours of employment. The theory of the exclusion has also been based on the flexible working conditions of professional employees which permit professional personnel greater freedom and latitude in hours worked and in outside professional or personal activities.

"The National Society of Professional Engineers believes that such a recognition of the essential differences between professional and non-professional employment is sound and should be continued in any revision of the Wage-Hour Law. The Society therefore is opposed to any revision of the law as applied to professional employees which would establish minimum earnings tests to qualify for professional status.

"The National Society of Professional Engineers further believes that cooperative efforts should be continued and expanded to bring about a greater recognition of professional status of professional engineers, both in terms of remuneration and in employment conditions. Employers should be encouraged to accord their professional engineer employees professional status in the fullest sense; in terms of improved economic position, allowance of working time for outside professional activities, registration under the state engineering registration laws, advanced education, and in all other possible ways to encourage the true spirit of professional-employer relationships."

This policy is stated in terms of proposed amendments to the law, as distinguished from the Administrator's regulations, because it was directed at pending legislation in the 84th Congress which proposes that a minimum salary of $6,000 per year be written into the law as a qualification for professional status and exemption from the minimum wage and overtime provisions. However, the philosophy behind this policy is equally applicable to the imposition of a minimum salary test through regulations of the Administrator.

Our objection to a minimum salary test for engineers is that it conflicts with the concept of professional status and professional employment practices. Professional engineers are opposed to what is called, "clock-punching." It is an undignified, unprofessional method of employer-employee relationship which is at variance with the principle of flexibility and mutual trust and respect which should be the guiding factor between professional engineers and their employers. As pointed out by the Society's Engineer-in-Industry Committee, in the recent publication, *A Professional Look at the Engineer in Industry*, "The objection is not only to the physical requirement of actual 'clock-punching,' but to the general psychology which is apt to prevail along with the practice. . . . Engineers should be, and in most cases are, salaried employees. They should not be paid on an hourly basis and should not be 'docked' on an hourly basis for occasional losses of working time."

Industry generally recognizes these principles and acts accordingly. Those who do not are finding it increasingly difficult to attract professional engineering employees so vitally needed today. The young men entering the profession today are apt to place great emphasis on professional employment conditions and practices in evaluating job offers.

We think that Congress recognized these concepts in exempting professional employees from the minimum wage and overtime provisions. We think it is reasonable to assume that Congress recognized that it is not desirable to place professional employees in a situation where the employer is required to impose a pattern of hourly record-keeping, whether it is by an actual "clock-punching" device or through other means.

We will also assume, if we may, that the Administrator is sympathetic with these professional concepts and recognizes the importance of flexibility in professional employment. The difficulty is that the Administrator, in fulfilling the responsibility imposed upon him by Congress in defining and delimiting the definition of "professional employee," has imposed a condition which, in some cases, forces the use of "clock-punching." This problem is not large in terms of the numbers of engineers affected, but the seriousness of the situation is not lessened for those who are required to enter their professional employment under unprofessional conditions.

Under the present earning test of $75 per week there are few, if any, qualified engineers who are not eligible for the exemption if they meet the other criteria established in the regulation. Our most recent salary survey shows that for those entering engineering employment in 1953 the median was $4,990 per year and the lower decile was $4,330, well above the figure required under the present regulation. The most recent reports on starting salaries for engineering school graduates is in the average range of $385 to $400 per month. The Administrator's compilation of "Earnings Data . . ." preliminary to this hearing states that of 2,217 establishments which employed one or more exempt professional employees during the first eight months of 1955, the number of professional employees earning less than $100 per week, "was extremely small," and that only 4 per cent of more than 15,000 professional employees earned less than $90 a week.

According to the Administrator's review, if the minimum earning figure were raised to $95 per week only a cumulative total of 7 per cent of professional employees would be ineligible for professional status and exemption, and if the figure were increased to $100 per week a cumulative total of 10 per cent would lose their right to professional status and exemption.

Perhaps these numbers are too small to worry about, but we do not think so. In view of these economic facts, we may ask why it is necessary to impose a minimum earning test to keep 4 per cent, 7 per cent or 10 per cent of an employment group out of a claim to professional status and exemption at the expense of denying professional status to those who do not meet the minimum earning amount temporarily at the start of their professional careers because they find it advantageous to start their careers in jobs which are not compensated

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JANUARY MEETINGS Of Note

American Road Builders' Association—Annual Convention, January 11-14, Miami Beach, Florida.

Seventh Annual Plant Maintenance & Engineering Conference—under Clapp & Poliak, Inc., management, January 23-25, Convention Hall, Philadelphia, Pennsylvania (in conjunction with the Plant Maintenance & Engineering Show, January 23-26).

American Society of Heating and Air-Conditioning Engineers—Annual Meeting, January 23-25, Sheraton-Gibson Hotel, Cincinnati, Ohio.

Engineers Joint Council—General Assembly, January 26-27, Statler Hotel, New York, N. Y.

American Institute of Electrical Engineers—Winter General Meeting, January 30-February 3, Statler Hotel, New York, N. Y.

Happy New Year! and welcome back to —PP—. We are going to start the New Year right, we think, by passing along to you portions of a talk made recently before a group of students of the University of Pennsylvania by NSPE Vice Presidential nominee A. H. Kidder, long a leader of the Pennsylvania SPE. It's directed to students but Engineer Kidder touches upon many "lessons for life" that will appeal to all. Mr. Kidder.

—PP—

Taking time out to plan broadly for the development of your maximum potential and satisfaction in your career, is unquestionably a most important step for one about to complete his basic training in the techniques and logic of engineering, regardless of the field in which he may have specialized. This is so natural a step that you have no doubt given it much thought already and have reached some tentative conclusions. It occurs to me, however, that it may be helpful to review a few considerations which should perhaps be incorporated in your plan. . . .

Perhaps the first . . . decision, and an extremely important one, will be that of selecting your first employer. This is an extremely difficult decision in these days of unusual opportunities for engineering school graduates. It is mentioned, however, only to illustrate the first of many situations in which you will find that non-technical considerations are quite likely to have important influence upon your career, because much will depend upon the accuracy of your judgment concerning the quality of instruction, guidance, and opportunities to which you will have access while serving more or less as an apprentice during these early years of your professional experience. Other comparably important decisions will require dealing similarly with values which are personal, or subjective, and seemingly elusive to one hitherto accustomed to dealing primarily with exact mathematical relationships. . . .

In K. K. Paluev's stimulating article, "How Collective Genius Contributes to Industrial Progress," *General Electric Review* for May 1941, he enumerates several qualities essential for a successful engineering career. These and others which are important and were no doubt tacitly assumed by Paluev are summarized below:

Honesty and Responsibility are acknowledged to be prime requisites for an engineer. His basic training naturally emphasizes the importance of honesty, if only because the rigorously exact relations between cause and effect in applied science permit of no careless or dishonest manipulation. It has been well said that an engineer cannot bury his mistakes. The philosopher in his realm may appropriately ask the question "What is truth?" The rigors of applied science, however, soon answer this question for the engineer who knows that he cannot have confidence in a calculation until he has proved his assumptions and his logic as well as his arithmetic.

Physical Qualities of Health and Vitality are also extraordinarily important and perhaps inseparable. Physical handicaps can be surmounted with extraordinary effort. However, good health is a priceless gift, worthy of careful stewardship.

Scholarship comprises a group of mental faculties which, without attempting to place them in the order of their importance, probably fall under the seven following headings:

Originality, or ability to free the creative imagination from the confines of mental habit.

Mental Courage, as required to free one's self from his own mental habits and previously conceived conclusions, in the pursuit of a soundly conceived departure from precedent. The more radical an advance, the more courage is needed.

Specific Knowledge is essential for one who must sense an opportunity for advancing the frontiers of knowledge.

General Knowledge in sufficient breadth to permit recognizing significant similarity or contrast between a phenomenon at hand and one which is known in another field is a prolific aid to the solution of new problems.

Analytical Ability is naturally required to resolve a problem into pertinent components and appraise their significance.

Ability to Synthesize ideas or things, in order to obtain new and useful results, is a faculty often found lacking in minds having extraordinary analytical ability.

Common Sense is needed to distinguish between essential and unessential details and to direct one's effort accordingly. Experience and judgment will largely determine the course to be taken and perhaps this explains in part why common sense so often seems uncommon.

Idaho Society of Professional Engineers—Annual Meeting, January 20-21, 1956, Boise Hotel, Boise, Idaho.

Texas Society of Professional Engineers—Annual Meeting, January 25-27, 1956, Edson Hotel, Beaumont, Texas.

Wisconsin Society of Professional Engineers—Annual Meeting, January 26-28, 1956, Schroeder Hotel, Milwaukee, Wisconsin.

NSPE Spring Meeting—February 17, and 18, 1956, Mayflower Hotel, Washington, D. C.

Minnesota Society of Professional Engineers—Annual Meeting, February 22-24, 1956, Nicollet Hotel, Minneapolis, Minnesota.

Kansas Engineering Society—Annual Meeting, February 23-24, 1956, Allis Hotel, Wichita, Kansas.

New Mexico Society of Professional Engineers—Annual Meeting, February 24-25, 1956, Alvarado Hotel, Albuquerque, New Mexico.

Oklahoma Society of Professional Engineers—Annual Meeting, February 24-25, 1956, Tulsa Hotel, Tulsa, Oklahoma.

Tennessee Society of Professional Engineers—Annual Meeting, February 24-25, 1956, Andrew Johnson Hotel, Knoxville, Tennessee.

Georgia Society of Professional Engineers—Annual Meeting, February 25, 1956, Dinkler Plaza Hotel, Atlanta, Georgia.

Nebraska Society of Professional Engineers—Annual Meeting, March 17, 1956, Omaha, Nebraska.

Ohio Society of Professional Engineers—Annual Meeting, March 22, 23, 1956, Biltmore Hotel, Dayton, Ohio.

NSPE State Presidents' Conference—March 23-24, 1956, Biltmore Hotel, Dayton, Ohio.

You have already gained a substantial measure of experience in developing the foregoing faculties, particularly as applied to the comparatively systematized portion of mental processes which consists largely of exact reason. It is suspected, however, that your necessarily intensive preoccupation with gaining essential scientific background and training in the logic of exact reasoning, may have required that you temporarily neglect development of the less formal mental processes, such as intuition, imagination and judgment, which are almost indispensable supplements to exact reasoning. . . .

Professional "Personality." Let us now turn our attention to that group of emotional and temperamental faculties which have much to do to determine not only the personality but the professional stature of an engineer. Paluev suggests eight emotional faculties which should be deliberately cultivated as an integral part of your professional "personality."

Constructive Discontent is the ability not only to see shortcomings, but the will to overcome them.

Enthusiasm is the indispensable faculty which impels one to accept personal risk, hard work, long hours, sleepless nights, exposure to criticism and, sometimes, to ridicule. The common experience of a resourceful mind is that when a difficulty seems unsurmountable, he is about to invent or discover a way out.

Persuasiveness is the ability to obtain cooperation by selling the idea in terms of the inherent authority of one's evidence and reason. Selling pressure almost invariably increases buying resistance. The fact that one who fails to "buy" a really good idea should share responsibility for the failure, only increases the challenge to the resourcefulness of a well prepared "salesman" who thinks and talks in terms of the buyer's interest.

Perseverence. The adoption of a good idea in some circumstances may require more than a year of continuous effort; otherwise the idea may become relegated to obscurity until another may "discover" it.

Energy is required because the road to progress seldom can be traveled in an armchair, even if on casters. There is no substitute for firsthand experience regardless of the effort required.

Initiative. Someone has to "start the ball rolling." The one best

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Mitchell

(*from page* 12)

lems of marketing—something he ought to be very familiar with before he orders a big change in product design. Or, in another example, it can let you know whether your chief sales executive ought to start doing a bit of homework in manufacturing processes. Everybody cannot call the signals in each instance of decision, but the good manager has to have an appreciation of the other fellow's point of view and the problems of another department, which will have a direct or an indirect effect on the maximum efficient operation of his own division.

The fourth and final step in preparing for an executive development program is the planning for management needs—the determination of what openings will occur as a result of expansion or changes in the organization, together with what replacements will be necessary because of turnover.

It is only after these preliminary steps have been taken that a company is really ready to begin its out-and-out management development plan. This brings me right back to Sylvania's program of Guided Experience, which is simply another name for on-the-job training. This is the first logical step to take, and I believe I can go so far as to say that it is the most important of all training techniques and that without it all others, whether on or off the job, will be far less productive, or even a complete waste of time.

In Guided Experience, you let the individual *manage*. He doesn't merely look over someone else's shoulder and observe what is being done. He gets in there—of course, with sufficient preliminary briefing—and, with a concrete understanding of that briefing or "guidance," he acts on it. This, of course, puts a pretty heavy responsibility on the manager who gives the guidance. But, on the other hand, one of the best measures of a manager is his ability to develop other managers; if he can't, perhaps he needs some more Guided Experience or extra homework himself.

Once the program of Guided Experience is well under way, then it is time to consider other techniques for training your managers. You may want to couple it with some job rotation or participation in special company projects. You may want to suggest and sponsor special off-the-job activities—participation in management development seminars or organizations; graduate work at a local university; a course outside of the man's particular field of specialization which will give him a better over-all understanding of the projects in which he is immediately involved; perhaps even such studies as public speaking or business writing.

Of course, all training programs will vary considerably from company to company according to the individual and specialized needs of the firms involved. In every firm, however, there are two other important points that should be remembered in connection with planning for future executive leadership.

The first of these items is the need for a degree of patience. "Give your own management development program a chance," and "Give your own men a chance" are two rules that ought never to be forgotten. There will always be a tendency somewhere along the line to spend less time with the training program and to go outside the company to hire first-string executive talent. I would not for a minute decry the benefits that accrue from "bringing new blood" into an organization from time to time. But the constant practice of always going outside to fill key positions seems to me to be a grave error in judgment. Calling a man "too young" or "too specialized" to try a new assignment often means ignoring a fine resource of talent within your own organization. Competent, ambitious people have a way of rising to meet the challenge of new positions that can be surprising and profitable for the company not afraid to trust them with the responsibility.

We learned that lesson at Sylvania when we grew so rapidly after World War II and promoted many of our younger people more rapidly than might normally have been expected. We have never been sorry about it. And, as a matter of fact, we now make very sure that we are keeping track of all our potential management talent through a special personnel inventory maintained in our New York corporate personnel department on all employees earning $6,000 or more per year. We have a cross index of candidates for various openings, regardless of their present location or division; so no one has to feel the least bit "pigeon-holed" when it comes to opportunity for advancement.

The other point that I want to mention is, of course, contingent on this very question of advancement. I refer to financial incentives. That is somewhat afield from the

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book looks

The Book: ***The Gadget Maker***

The Author: **Maxwell Griffith**

The Publisher: **J. B. Lippincott Company**

Reviewing the Book: **Paul H. Robbins, P. E., Executive Director, National Society of Professional Engineers**

All professional engineers undoubtedly will take exception to the title of this book. However, once they have gotten into the novel itself, they will recognize immediately that it could be written only by an engineer. None of the members of the profession like to think of their work in the realm of gadget making; and certainly in the development of the novel, except for the experiences of the hero in his youth, none of the inventions fall in the category of gadgets.

In some respects, the novel probably has more meaning for engineers than for the non-engineering reader; for the engineer can visualize clearly some of the experiences and mental gymnastics encountered by the hero in his career.

The story of the gadget maker is a biography of Stanley Brack from his childhood in Lupine, Colorado, through his studies at M.I.T., and his work as an aeronautical engineer with the Amalgamated Aircraft Company on the West Coast. For those who are interested in the professional development of engineering, there are a number of experiences in his chronology which show a keen insight on the part of the author to some of the questions that arise in the minds of young engineers.

Young Brack proves to be an outstanding student in high school, and while it is a well-known fact that better-than-average high school students turn to engineering and careers in science, it would be unfortunate if the readers of the novel gain the impression that only such gifted young people could be successful in engineering. His experiences at M.I.T. can be particularly appreciated by one who has studied there. The insight shown by the author in recording the reactions of Stanley Brack could be given only by one who has experienced them himself.

There are a few references in the book which are specifically in error; for example, his reference to the engineering honor society as Tau Beta Kappa instead of Tau Beta Phi; but, by and large, it displays a keen appreciation of engineering in the mid-century. Particularly is this true as he records the reactions of the young engineer as he struggles with his collegiate education and approaches his first job. The treatment he gets on reporting for work immediately out of school points up a particular problem to which industry should give attention; namely, the same reception given to the new professional employee as that accorded to any clerical or laboring employee and treatment in the personnel office as just another applicant. Obviously, the young engineer is annoyed and finds he has a sympathetic ear from his first boss, as indicated by the following exchange. "As a matter of fact," Brack confessed, "I really didn't know whether I would need my drafting instruments or not. All I knew was that I was hired as an Engineer B, whatever that is. That's all they told me in the letter." "An Engineer B is a draftsman," said the boss dourly. "The fancy name is personnel's idea."

The period of time in which the story is told covers the education of the young man prior to the war, his being convinced of his importance on the homefront because of his aircraft work during the war, and his ultimate assignment as a project engineer on secret guided missile work. Again the author shows his keen insight into the reaction of young men in his description of the conflict of feelings the hero has with respect to service with the armed forces.

There are some good professional philosophical presentations in the book. The general reaction of the young man that hard work, doing a good job, putting in more than is required, will ultimately be recognized. His human reactions come into play from time to time when he becomes discouraged and convinced that this is not so; but his determination wins out in the end.

A particular point of conflict arises when he is pressured to become a member of a union, on the philosophy that by so doing his status can be enhanced. Nevertheless, his soul-searching on this problem points up the need for effective professional organizations to work on behalf of young engineers.

In places, it is felt that from the standpoint of a novel and the average reader, the descriptions are a bit too technical and may become somewhat tedious. However, there are some excellent descriptive passages in the book to give a better understanding of engineering. Particularly is this true in connection with the work assignments of a project engineer. After this very excellent description of his work, he boils it down with the following:

> "He was paper-shuffler, expediter, father-confessor, order transmitter, big dealer, taskmaster. He was the captain of the team but, too, a little of the spectator."

This reviewer questions that the novel will ever be made into a movie. It probably does not have the broad appeal necessary for wide readership; but for engineers and those who have an interest in what makes young men tick in the engineering profession, the *Gadget Maker* is a novel which I am sure will be enjoyable reading.—***End.***

Meet the Reviewer . . .

Paul H. Robbins

Paul H. Robbins, NSPE's executive director, is well known in professional circles throughout the country and is frequently called upon as both an author and a speaker.

A native of Syracuse, New York, Mr. Robbins holds degrees from Syracuse University and the Massachusetts Institute of Technology, and he has also done graduate work at Columbia University. He has taught at the Cooper Union, New York University, and the University of Maine.

In 1941, he was employed as a full-time consultant on engineering training in the executive office of the Mayor of the City of New York. With the activation by the Army of the New York Port of Embarkation, he later became director of training.

With NSPE since 1946, Mr. Robbins is a member of Tau Beta Pi, for which he is also director of fellowships, Phi Kappa Phi, Delta Sigma Rho, the American Society for Engineering Education, the American Society for Photogrammetry, the Society of American Military Engineers, and other groups.

History of American Industrial Science

by

Courtney Robert Hall

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Reviewed in November, 1955, *American Engineer*

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Meeting

(*Continued from page 5*)

will follow the formal ceremony which will be held in the late afternoon.

The always - popular "Regional Luncheons" presided over by the NSPE vice presidents have also been scheduled for the 17th prior to the afternoon professional session and the dedication ceremony. The luncheons, at which members and delegates from the various sections of the country have a chance to get acquainted and discuss problems of local interest, will be held at the Mayflower.

Members of the District of Columbia Society of Professional Engineers will serve as hosts for the event, and they are now assisting in the final planning for the meeting which will conclude with the professional session following the special luncheon on Saturday.

As is the usual custom, the Spring Meeting will be preceded by a day-long conference of the NSPE Executive Committee on Thursday, February 16.

NSPE members are being urged to make a special effort to be on hand for the meeting and the dedication of the Society's new headquarters. The numerous opportunities for sight-seeing and visiting historic places in the vicinity of the Nation's Capital will be an added incentive to many to take advantage of the chance to participate in the Spring Meeting program.

Neff Speaks In California

NSPE President Allison C. Neff was the guest of honor and featured speaker at a recent meeting of the Golden Gate Chapter of the California SPE. He spoke on the subject, *Contributions of NSPE to Professional Unity and Progress.*

Final preparations for National Engineers' Week get under way in Maryland as committee members look over the one-minute TV films ordered from the National Society. From left to right are Herb Davis, Corps of Army Engineers for Baltimore; Charles McCaffray, publicity chairman for the Maryland Society of Professional Engineers; and Carroll Williams, business editor of the Baltimore *Sun*.

Ike Salutes Engineers' Week in Letter to Neff

President Eisenhower has given official recognition to National Engineers' Week and paid tribute to the members of the engineering profession as "men whose practical applications of scientific knowledge have played a major role in our nation's achieving the highest standard of living the world has ever known."

The President made the statement in a letter from his Gettysburg office to Allison C. Neff, president of NSPE.

The letter, dated December 15, was the first in a long list of similar letters and proclamations by state governors and the mayors of hundreds of cities throughout the country.

Stating that he was "glad to pay tribute to the engineering profession," President Eisenhower pointed to the need for engineers to "help maintain national security and promote the national welfare."

The President expressed the hope that the programs of the 1956 National Engineers' Week "will serve to acquaint many of the talented and creative youth now in our high schools with the splendid opportunities for national service which are open to them in the engineering profession."

The letter ended with the hope that the Engineers' Week programs would increase the public's knowledge and appreciation of the debt this country owes to the engineering profession.

Reproductions of the letter on White House stationery have been made and may be ordered in quantity at no charge. In past years local chapters and state societies have used the President's letter in numerous ways—in large "blowups" for window or lobby displays, in newspaper reproductions, in society publications, etc.

Meanwhile final plans and preparations for the 1956 National Engineers' Week went into the "home stretch" stage this month with the approach of George Washington's birthday week, February 19-25.

Local Engineers' Week chairmen and their committees throughout the country were busying themselves with the meetings and arrangements that a successful program demands. The earliest local newspaper publicity on the Week was received from such widely separated communities as Waterbury, Connecticut, and Phoenix, Arizona. In the latter state, plans are being made to publish a 14-page newspaper section devoted to engineering.

The NSPE headquarters office is receiving a steady stream of orders for promotional material. Although more than 1,000 Engineers' Week kits were distributed, the demand far exceeded the supply.

Several thousand additional copies of "The National Engineers' Week Story" were printed after the original supply was exhausted. The attractive illustrated booklets were ordered in large numbers by industrial firms, and by chapters for distribution to local industries. The booklets may still be ordered in quantity at no charge.

NEW Processes . . .

Developments In Controlled Electric Space Heating

CONTROLLED electric space heating is said to provide the cleanest, safest and the most efficient form of heat and is currently in increasing demand, even though it is not the cheapest method of heating today. Inasmuch as utility rates have been steadily on the decline for the past two decades, however, it is within the range of most competitive fuels.

Coming into more frequent usage in this field are efficient and economical radiant glass heating panels. This form of heating was invented for use in the famous Maginot Line of France. From a wartime duty, it is now used in this country, Canada, Mexico and abroad.

In order to be suitable for electric heating, a house should have adequate insulation on all sides. This insulation will lower the transmission heat loss considerably and the infiltration heat loss is based on only one air change per hour. Excess air for combustion is not required, individual room thermostats provide the owner with maximum comfort, a chimney now becomes an ornamental decoration for the fireplace, the utility room can be added to living space and the cellar is now a large workshop or recreation room.

After many tests, radiant glass heating panels were introduced to the United States in 1948 by the Continental Radiant Glass Heating Corp. These panels are composed of three primary components: (1) a special tempered lime glass sheet with a fused-on aluminum element for resistance; (2) an aluminum reflector placed behind the glassplate; and (3) a mounting frame so constructed that the unit may be fastened to the wall. The aluminum reflector reduces the reverse heat loss of the panel so that all the infra-red rays are emitted into the room. According to Continental, this method of heating permits higher humidities thereby having a higher degree of comfort. The infra-red rays restore the radiation loss of the human body, also contributing to greater comfort at lower air temperatures.

The glass panels are available in all voltages and range from 450 watt to 1500 watt capacities. The average room, under proper insulation, would require one 1000 watt unit while a larger room may require two 1000 watt units.

Radiant glass heating units have been installed in numerous homes, schools, hospitals, motels, office buildings, etc. They have been used as auxiliary heating in offices of industrial plants, babies' nurseries, guard houses, to protect sprinkler valves and to heat boats.

The initial cost is considerably less and since no moving parts are used, there is little maintenance.

In designing a radiant glass heating system, the lower the heat loss, the lower the fuel bill, therefore, proper insulation is extremely important. Panels should be located under the windows and on exterior walls whenever possible. A thermostat is provided in every room to prevent overheating and also to provide individual control.

To obtain the kilowatt hour consumption, the FHA has devised a formula based on Bureau of Standards tests, specifically for radiant glass heating:

$$KWH = \frac{\text{BTU Loss X Degree Days}}{\text{Temp. Diff. X 200}}$$

A factor of 170 was formerly used for all electric resistance heating. Since electric heating is theoretically 100% efficient, the glass panels with radiant output and individual room controls, as shown by the above formula, are said to operate cheaper than standard electric heaters.

About 90% of the country enjoys electric rates that are economical for a properly installed electric radiant glass heating system. Factors involved in this consideration are lower building costs, interest and amortization charges, absence of maintenance, etc.

The electric radiant glass heating panels are allies to the air conditioning industry. Most utilities are experiencing increased air conditioning loads in the summer when transformers have little or no overload capacity. These same radiant glass heating panels will aid the utility in the valleys on their winter load with the same transformer allowing for 190% overloads in cold climates.

With the atom turned to peaceful purposes of making electricity, with new dams providing hydro-electric plants, with conservation of our natural resources and with the program of adequate wiring, the stage is set for increasing use of electrified heating in homes and industry.—***End.***

Radiant heating panel of tempered lime glass, with fused-on aluminum element, is shown in preferred position. Individual thermostats offer controlled heat.

With Our Members . . .

Vocational Guidance

Broome Area Chapter Participates In Local School Program

Taking part in the vocational guidance project being sponsored by the Roberson Memorial School of Binghamton, New York, members of the Broome Area Chapter of the New York State SPE recently presented the first in a series of programs designed to assist the career choice of local high school students.

Initial plans for the series were made by Keith Martin of Roberson Memorial and J. C. Dykman of the Technical and Engineering Council of Southern New York. The engineering field was given special attention by the selection of the Broome Chapter P.E.'s to give the first program and of engineers from the mechanical, chemical, and electrical engineering societies to give succeeding presentations.

The program prepared by the chapter was designed to show that students who are interested in entering engineering must excel in mathematics and science and possess such qualities as analytical ability. The professional aspects of engineering as a career were the points primarily stressed by the Broome P.E.'s, leaving detailed discussion of specific technical areas for the programs to be presented by the technical societies.

The dual panel form of presentation was used for the program. With Thomas Black acting as moderator, the members of a panel of students asked questions concerning engineering and professionalism, which were in turn answered by the members of the panel of P.E.'s. Chapter members participating in the discussion were Anthony F. Gagne, William H. McFarland, Arnold W. Milliken, Norval L. Platt, and C. Herbert Ridgely. The students were Robert Frank, William Larrabee, William Collins, Bruce Brundage, Francis Gray, and David Adams.

P.E. PUBLICITY CHAIRMEN

YOU have a date for FEBRUARY 25th!

That's the time to send your Engineers' Week story to the *American Engineer*.

As usual, space will be limited but we will give as wide coverage as possible. So get the news of the week's outstanding events in the mail EARLY.

FEBRUARY 25th is the day to do it!

Data Processing Lecture Is Given

Edward Ormsby, applied science representative of the International Business Machines Corporation, was the guest speaker at the December meeting of the North Central Chapter of the Ohio SPE. Mr. Ormsby explained IBM's new Magnetic Drum Data Processing Machine and discussed applications of stored program concepts for solving scientific problems.

The meeting was held in Mansfield in the City Building.

Legislator Speaks In Wisconsin

The Honorable Mark Catlin, speaker of the Wisconsin State Assembly, was the guest lecturer at a recent monthly meeting of the Fox River Valley Chapter of the Wisconsin SPE. Assemblyman Catlin spoke on the theme, *Unions and Unionism*, sketching the history of labor relations legislation in Wisconsin. He also discussed the question of individual political activity.

The meeting was held at the Foeste Hotel in Sheboygan, with Chapter President Robert Stieg presiding. A special guest was A. Owen Ayres, president of the Wisconsin SPE. The speaker was introduced by Clarence Zachow, president of the Atlas Conveyor Company.

The December meeting of the Fox River Valley group was a social event with the wives of the engineers as guests of the chapter and a program consisting of a play presented by the Oshkosh Community Players. The party was held at the American Legion Club in Oshkosh.

Delaware P.E.'s Hear L. R. Crittendon

L. Ray Crittendon, deputy director of the Mechanical Development Laboratory, Development Engineering Division of the DuPont Engineering Department, was the guest speaker at the December dinner meeting of the Delaware Society of Professional Engineers. The title of Mr. Crittendon's address was *Machines for Industry*, and he discussed the development and design of machines to meet industry's demand for improved products, increased production, and lower costs.

Robert W. Ewing, Jr., served as chairman for the evening. The meeting was held at Hanna's Restaurant in Wilmington.

. . . more news on page 37

PROMOTING MATH AND SCIENCE—The pictures below show two groups interested in giving sound vocational guidance to high school students interested in engineering. The photo at the left was made during the charter meeting of the first chapter of the Future Engineers of America, sponsored at Harding High School, Marion, Ohio, by the local chapter of the OSPE. Left to right are: Rex Kilbourn, president, Marion Chapter; Ellis Wilson, chairman, Education Committee; John Thomas, president of the new Harding High FEA Chapter; and Joseph Petrich, club faculty advisor.

The second picture shows the P.E. participants in the engineering panel discussion at Roberson Memorial School, Binghamton, N. Y. (See story above.) The panelists, all members of the Broome Area Chapter of the NYSSPE, are: Thomas Black, moderator for the engineers' panel, and William H. McFarland, Norval L. Platt, Anthony F. Gagne, C. Herbert Ridgely, and Arnold W. Milliken.

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New Chapter Holds First Meeting

The first meeting of the new Peninsula Chapter of the Virginia Society of Professional Engineers has recently been reported. Held at the Warwick Hotel in Newport News, the meeting featured an address by James J. Corbalis, Jr., outgoing president of the VSPE, and a talk by Mark C. Hopkins, general manager of the Yorktown Refinery of the American Oil Company. Another honored guest was James A. Rives, president of the Virginia State Board of Examiners.

Thirty-two charter members of the new chapter participated in the meeting, as did members of the Tidewater Chapter, which had sponsored the formation of the new group.

PENINSULA OFFICERS — Officers of the new VSPE Peninsula Chapter are pictured at the right. They are (left to right): Edward W. Digges, director; Edwin M. Moggio, director; Franklin R. Murray, president, George J. Viertel, first vice president; and Henry T. Thornton, Jr., secretary-treasurer. Hobart Speegle, Jr., second vice president, and Louis F. Trost, assistant secretary-treasurer, were absent when the picture was taken.

Certificates Are Bestowed In Columbus

The Rose Room of the Virginia Hotel in Columbus was the scene of a recent registration certificate presentation ceremony sponsored by the Franklin County Chapter of the Ohio Society.

The chapter was host to members and new registrants of the Central Ohio, Eastern Ohio, Hocking Valley, Marion, Muskingum, Ohio Valley, Portsmouth, Southern Ohio, and Zanesville Chapters for the occasion. Guest speaker was Henry J. Linton, a prominent Columbus attorney.

Panel Discussion On Consulting Practice

The establishment and operation of a consulting engineering practice was the subject of a panel discussion held on December 1 at the Hotel Statler in New York City. The program was sponsored by the Education Committee of the New York Chapter, NYSSPE.

Participants in the panel were Harold G. Abbey, James P. O'Donnell, Samuel S. Aidlin, and Charles J. Wurmfeld.

. . . more news on page 39

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Restricted to Registered Professional Engineers . . . Directory Continued on Next Page

San Jacinto Chapter Has New Officers

New officers and directors of the San Jacinto Chapter of the Texas Society of Professional Engineers were installed at a December 12th dinner meeting in Houston. They are: Gilbert L. Leach, president; T. Spence Love, first vice president; Charles F. Talbot, second vice president; Robert P. McCants, secretary-treasurer; and Walter E. Dickerson, Sheldon W. Greer, Charles F. McGinty, Reg F. Taylor, and C. A. Voght, directors.

Student engineers from the University of Houston presented the program for the evening.

Erie County P.E.'s Hear State President

Herbert F. Roemmele, president of the New York State Society of Professional Engineers, was the guest speaker at a recently-reported meeting of the Society's Erie County Chapter. Mr. Roemmele, who is also dean of students at the Cooper Union and a professor of mechanical engineering, discussed the workings of the State Society for the Erie County group.

John Beane acted as program chairman for the evening.

Tulsa Engineers Hear R. L. Flanders

R. L. Flanders, dean of the School of Civil Engineering, Oklahoma A&M College, was the guest speaker at a recent meeting of the Tulsa Chapter of the OSPE. Dean Flanders, who has just returned from a nine-months stay in Ethiopia under the Point Four Program, described his experiences while acting as an advisor in sanitary engineering and water supply systems in that country.

. . . more news on page 40

BRONX DINNER-DANCE — The photograph at the right was made during the recent annual dinner-dance sponsored by the Ladies' Auxiliary to the Bronx County Chapter of the New York State SPE. Seated, l. to r., are: Mrs. George Wilson, Mrs. Henry Vermont, Mrs. Otto Mald—auxiliary president, Mrs. Ernest Fox, Mrs. John Knight, and Mrs. James Brunn.

Standing are: Mrs. Allen Keller, Henry Vermont, Mrs. David Gordon, Otto Mald—chapter president, Ernest Fox, Harrison Blankstein, Dr. Anatole R. Gruehr—NSPE Public Relations Chairman, and James Brunn.

PROFESSIONAL DIRECTORY

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St. Lawrence Seaway Is Meeting Topic

The St. Lawrence Seaway and its effect on the city of Milwaukee was the topic under discussion at the December 13th dinner meeting of the Milwaukee Chapter of the WSPE. Guest speaker for the occasion was Harry C. Brockel, Milwaukee municipal port director, who is well known for his contribution toward making Milwaukee a world port.

Regional Planning Is Discussed

Richard W. McGinnis, director of the Lorain County Regional Planning Commission, was the featured speaker at a recent meeting of the Lorain County Chapter of the Ohio SPE. Mr. McGinnis, who is newly appointed to the county post, discussed *The Functions and Objectives of Regional and City Planning Commissions.*

Chapters Plan For Engineers' Week

As this issue of the AMERICAN ENGINEER goes to press advance reports of plans for Engineers' Week programs are begining to come in from chapters throughout the country. The '56 observance is scheduled for the week of February 19-25.

One of the first reports was the word from California that the Southern California chapters of the CSPE and the Los Angeles Council of Engineering Societies are planning a joint dinner meeting to be held Thursday, February 23, at the Biltmore Hotel. The announcement was made in a joint statement by Edward G. Lowell, president of the Pasadena Chapter, CSPE, and N. A. D'Arcy, Jr., president of the Council, which is composed of the local branches of the Founder Societies and the Southern California Chapter of the Structural Engineers Association.

The members of the Travis Chapter of the Texas SPE have approved a seven-point program of activities for the Week. Plans include talks to be made before civic clubs by chapter members, radio and television programs, poster and other displays, a meeting concerning registration on the campus of the University of Texas in Austin, and various social events.

R. S. King Dies

Dr. Roy S. King, a past national director of NSPE and a most active member of the Georgia Society, died recently in Atlanta.

Dr. King was head of the Mechanical Engineering Department at Georgia Tech from 1917 to 1946. He served on the Georgia State Board of Registration for Professional Engineers and Land Surveyors from 1937 until the time of his death.

He had been honored as a Fellow of the American Society of Mechanical Engineers, and he also belonged to the Newcomen Society, the American Academy for the Advancement of Science, Tau Beta Pi, Sigma Xi, and many other groups. He was also one of the founders of the Georgia SPE.

—PP—

(*Continued from page 31*)

qualified probably is the one who conceived the idea in the first place. The one who takes the initiative naturally receives credit for the idea, as well as for its application.

Sense of Humor. A strong sense of relative values based on tolerance, and a sound personal philosophy, is needed to overcome the normal disappointments, misunderstandings, frustrations and occasional "unhappy endings," which are to be expected.

Cooperation is indispensable. No one can obtain it, without giving it. Its stimulants include sympathy, kindness, personal interest, and understanding. One of the prophets has well said "With all thy getting, get thee understanding." This talent can be acquired by self-discipline, but a natural inclination is extraordinarily helpful.

Failure to develop the full potential of his professional personality places upon the engineer a handicap which alone is sufficient to explain why there are today far too many otherwise qualified engineers who find themselves relegated to assignments in which their talents are used primarily for data gathering and processing, a function which is rapidly being transferred from men to machines. Much can and will be done to relieve this situation. Fortunately, your generation of engineers can be relieved of a portion of the mental drudgery previously unavoidable and a definite handicap to innovation.

It will be especially important nevertheless for you to search out and seize opportunities to overcome a perhaps natural tendency to avoid situations in which your personality plays an extremely important part. Even though you may first rebel at the thought, you should deliberately undertake to develop these emotional qualities not only as an integral part of your professional experience, but also in becoming active both in your professional and technical societies, and in your church, your community life and even in politics, which present unusual opportunities for gaining valuable leadership and management experience early in your career. When doubts assail you, it will help immeasurably if you will remind yourself in all humility, that very few of your neighbors have the training or experience comparable with that which you can bring to bear upon your mutual problems.

(*Continued on page 45*)

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Grad. INDUSTRIAL Engr. in the CONSULTANT MANAGEMENT ENGINEERING FIELD. Age 28-35. Exp. in woodworking will be helpful. Exp. in work measurement (preferably predetermined time systems using MTM). Work background with incentives. Must be willing to travel. Salary open. (8-S-2)

STRUCTURAL Engr. with several years exp. in design of material handling structures such as ore bridges, wharf cranes and miscellaneous coal and ore handling equipment; location in Cleveland; salary open. (10-S-2)

B.S. or M.S. in MECHANICAL, CIVIL or ADMINISTRATIVE Engr. for PROJECT ENGR. Ten yrs. out of college. At least two yrs. in mgt. of constr. of industrial plants. Responsible for constr. of new facilities for the company. Selects general contractor, directs the purchasing & expediting, estimates total plant cost, and follows execution by the contractor. Salary commensurate with training. (21-S-14)

MECHANICAL EIT not over 28. For design: material handling; glass forming machinery. 100% board work. Central Ohio. (28-S-6)

CIVIL Engr. with exp. in water & sewage works projects or related field. Permanent with old est. consulting form. Northern Ohio. (40-S-2)

CHIEF ENGINEER—Exp. in heavy equipment such as pressure vessels for mechanical development and design of all products. Redesign of present equip.; to assist in devel. an integrated line of standardized equip. and components; supervise all drafting and blueprinting; develop engr. methods; set engr. stds.; and perform related functions. Salary $12,000. (49-S-7)

Young Grad. CHEMICAL Engr. as RESEARCH CHEMIST with rubber industry. $540 starting salary, with unlimited advancement. (120-S-12)

PROCESS ENGINEER—Engr. degree necessary. 28-45. 5 yrs. actual exp. in process engineering or factory prod. engr. for assignments in metal fabrication industry. Responsible for coordinating most economical production processes, methods, tooling, equipment, work flow and layout for Production department. Salary depending on actual exp. (145-S-6)

Positions Wanted

Reg. INDUSTRIAL Engr.—Grad. MECHANICAL Age 42. Courses after graduation in industrial management and engineering. Heavy exp. in Estimating, Production & Industrial Engineering. Over 8 yrs. exp. at staff level in industrial and manufacturing engr. Desires position commensurate with ability and training. Mid-West Area. $800 month. (A-27)

Reg. ELECTRICAL Engr. Age 30. Exp. in high frequency communications and industrial electronic controls. Holds first class radio telephone, second class radio telegraph and commercial pilot single and multi-engine licenses. Desires adm. position in application, survey or sales. Will travel ext. or consider foreign service. $8,000. (A-489)

Grad. Reg. CIVIL Engr. Age 38. 17 yrs. exp. in many phases of civil engr. with emphasis on structures. Supervisory & teaching exp. Knows pressure vessels. Has done consulting. Wants proj. engr. or other position with technical and supervisory duties. $10,000. (A-518)

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STRICTLY BUSINESS

Personalities . . . The **Pittsburgh Corning Corporation** has announced the appointment of **Walter Lovett** as manager of its newly-created Technical Services Department. . . . **S. D. Payzer,** vice president in charge of engineering for the **D. J. Murray Manufacturing Company,** Wausau, Wis., has been elected a member of the firm's board of directors. . . . The appointment of **Lloyd C. Harriott** as manager of control systems engineering in the **General Electric Company's** General Engineering Laboratory in Schenectady has been announced. . . . The appointment of **Kenneth H. Robbins** to the position of industrial engineering manager of the **Industrial Rayon Corporation,** Cleveland, has been announced by **I. T. Meyer,** vice president in charge of manufacturing. . . . The firm of **Smith, Scherr & McDermott,** Designers, of Akron, O., has announced that the following are new members of its staff: **Alfred Przybylowicz, Frank J. Lengyel,** and **Roger C. Prince.** . . . **David C. Ekey** has been named director of research for the **Lebanon Steel Foundry,** Lebanon, Pa., according to **W. H. Worrilow,** president.

Mr. Lovett

Edward J. Lunney has been appointed chief engineer in charge of the Research and Analysis Department of **Barry Controls Incorporated,** Watertown, Mass., according to an announcement by **Charles E. Crede,** vice president for engineering. . . . **A. A. Bliss** has been named to the position of electrical engineer with the **Thatcher Glass Manufacturing Co.** of Elmira, N. Y., in charge of electrical design and construction in the company's five plants located in Elmira, Jeannette, Pa., Lawrenceburg, Ind., Streator, Ill., and Saugus, Calif. . . . The election of **Frank L. Whitney** and **E. G. Robbins** as vice presidents of **Walter Kidde Constructors, Inc.,** engineers and builders of New York and Houston, has been announced by **William Collins,** president. Mr. Whitney will be vice president in charge of engineering, while Mr. Robbins will be in charge of construction. . . . **S. S. Price** has been named manager—panelboard and motor control design engineering and **A. H. Adams** has been appointed manager—switchboard and distribution center design engineering in the Distribution Assemblies Department of the **General Electric Company** in Plainville, Conn.

Mr. Bliss

Wilson P. Cogswell has been appointed staff assistant for operational analysis—military in the Engineering and Research Department of the **Stromberg-Carlson Company,** Rochester, N. Y., a division of **General Dynamics Corporation.** . . . Appointment of **Capt. Thomas G. Reamy,** USN, ret., as an application engineer has been announced by **ALCO Products, Inc.,** Schenectady, N. Y.

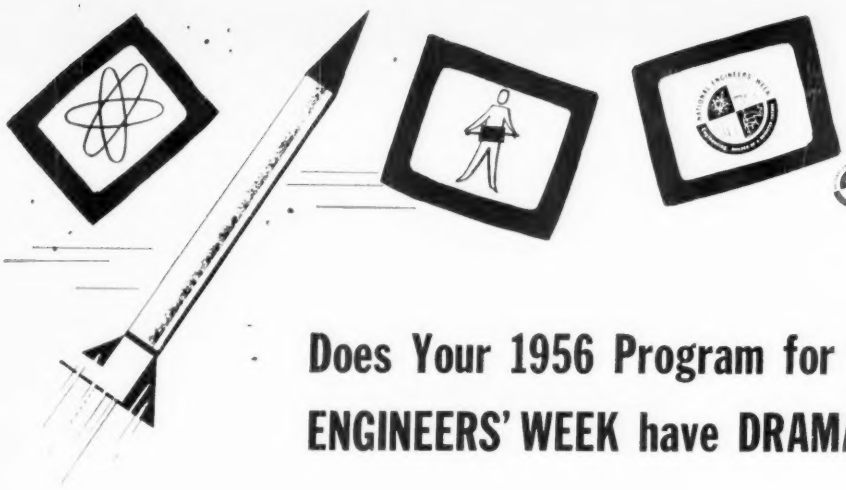
. . . **Clarence Wantz** has been named chief engineer in charge of the Engineering Department of the Robertshaw Thermostat Division, **Robertshaw-Fulton Controls Company,** in Youngwood, Pa. . . . **Haskins, Riddle & Sharp,** consulting engineers of Kansas City, Mo., have announced the expansion of their technical staff over recent months to include **G. Russell Huff, Charles P. Brooks, Howard Houska, Edward C. Maran, L. S. Walker, John A. Zaffle, Marlowe Lankford,** and **L. E. Ordelheide.** . . . **Robert Astle** has been appointed assistant chief industrial engineer for **McCulloch Motors Corporation,** Los Angeles, according to **Robert Moody,** planning manager.

Mr. Wantz

Operational Expansion . . . **Guy B. Panero Engineers** of New York City has announced the opening of European offices in Paris and Rome. . . . Creation of two new divisions has been announced by **North American Aviation, Inc.,** of Los Angeles. They are the **Rocketdyne Division** to carry on continued research, development, and manufacture of high-powered rocket engines and related items and the **Autonetics Division** for continuation of engineering and manufacturing operations in the electromechanical field. . . . **Vitro Laboratories,** a division of **Vitro Corporation of America,** will build a new million-dollar laboratory near Silver Spring, Md., according to an announcement by **J. Carlton Ward, Jr.,** president . . . The formation of a new department in Baltimore for the manufacture of a line of industrial electronics products has been announced by the **Westinghouse Electric Corporation. Robert C. Cheek** has been named manager of the new department. . . . **E. K. Meredith,** president of **Weber Aircraft Corporation,** Los Angeles, has announced the establishment of a new **Electronics Division** at the company's Burbank, Calif. plant, with **James Holahan Doyle** as divisional manager. . . . The **Garrett Corporation,** Los Angeles, has established the new **Rex Division** to conduct a long-range research and development program in aeronautics, according to **W. C. Whitehead,** executive vice president.

New Firms . . . Establishment of a new Chicago architectural firm under the name of **Howard T. Fisher & Associates Pruyn and Bryant, Inc.** has been announced by its president, **John A. Pruyn.** It represents a merger of the architectural and planning functions of **Howard T. Fisher & Associates** and the architectural firm of **Bryant and Walchli.** . . . Formation of the **Agile Plastic Corporation of California** in Santa Ana has been announced by **Dr. J. A. Neumann,** president of the **American Agile Corporation,** Maple Heights (Cleveland), O.

Ownership Changes and Mergers . . . The Shreveport, La. plant of the **American Creosoting Company** has been purchased by **Olin Mathieson Chemical Corporation,** according to **W. H. Brown,** vice president for lumber operations.



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February 19-25

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2. "PROJECT SATELLITE—AN ENGINEERING STEP TO OUTER SPACE:" This is a 15-minute tape recorded radio show that tells the engineering story behind the planning and construction of the proposed earth satellite. It features President Eisenhower's press secretary, James Hagerty, making the White House announcement that the U. S. would build a satellite, and a talk by Dr. Fred Singer, the University of Maryland physicist whose calculations for the MOUSE project have been widely discussed in scientific circles. A dramatic public service program with radio network voices. Price: $7.

3. SET OF SEVEN TV SLIDES: Here is a chance to get TV coverage every day during the Week. These expertly prepared slides are designed for use on TV station breaks. They feature poster-type art work and printed copy calling attention to engineering and the Week's observance. Price: $10 per set of 7.

4. POSTERS: Colorful 10¼ x 10¼-inch coated cardboard posters carrying the 1956 Engineers' Week emblem. Prime necessities for bulletin board, window, and other displays. Large-size (22½ x 22½-inches) also available. Prices: 10¼-inch, $4 per 100; 22½-inch, $5 per 100.

5. PAPER BANNERS: Excellent for display use. Three feet long by 6 inches wide. Has poster design and words "National Engineers' Week," in color. Price: $4 per 100.

6. ENGINEERS' WEEK SEALS: Use these brightly colored seals on all your mail from now through Engineers' Week. Poster design printed on 1½-inch gummed paper. Price: $3 per 1000.

7. NEWSPAPER MAT STORY ON SPACE SATELLITE: A feature article on the engineering behind man's first step into outer space. Prepared on mat, ready for immediate insertion in daily or weekly newspaper. Price: 50c each.

8. NEWSPAPER MAT STORY ON GEORGE WASHINGTON AS AN ENGINEER: A feature article, with illustration, based on fresh material gathered by writer visiting Washington's Mount Vernon home. Ready for immediate newspaper insertion. Price: 50c each.

9. LOGOTYPE: A metal cut of poster design to insert in advertisements, printed matter, etc. All state society and chapter publications should have one. Excellent for use in industrial house organs and other publications. Price: $1.50 each.

10. "THE USS NAUTILUS—AN ENGINEERING AGE TRIUMPH:" A re-issue of the 15-minute tape recorded radio program distributed last year. Just as timely this year, if your chapter did not use it in 1955. Tells the engineering story behind the first atomic powered submarine. Price: $5.

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- ☐ 3. TV slides. Set of 7 slides, @ $10 per set.
- ☐ 4. Posters, regular size @ $4 per 100. Posters, large size, @ $5 per 100.
- ☐ 5. Banners @ $4 per 100.
- ☐ 6. Seals @ $3 per 1000.
- ☐ 7. Newspaper mat story on space satellite @ 50c ea.
- ☐ 8. Newspaper mat story on Washington as engineer @ 50c ea.
- ☐ 9. Logotypes @ $1.50 ea.
- ☐ 10. Radio tape, "The USS Nautilus—An Engineering Age Triumph," @ $5 ea.

...NEW LITERATURE...

To help the offering firms determine which literature you require, when requesting an item, be sure to list all specifications shown . . . and say you saw it in the AMERICAN ENGINEER.

CHAINS, DRIVE WHEELS — "Dura-Tred" Chains and Beaumont Drive Wheels for bucket elevators and conveyors are described in a new catalog, No. DC-855, just published by Beaumont Birch Co. Includes a detailed discussion and illustrations of this design "chain with the wear tread" and traction, sprocket, and "Trac-Pull wheels. Tables on the relative corrosion resistance and physical properties of various chain metals are included. Combination and pintle types of chain are illustrated with complete lists of available sizes. Full details on driving wheels incorporate pitch diameter, bore, and weight data. Copies of Catalog DC-855 can be obtained on request from Beaumont Birch Company, 1505 Race Street, Philadelphia 2, Pa.

—AE—

TUBES—A new 8 page technical folder, (TB-329B), on heat exchanger and condenser tubes has been issued by the Tubular Products Division of the Babcock & Wilcox Company. Covers pertinent information on all of the various popular grades of carbon, alloy and stainless steel heat exchanger tubing, both seamless and welded. Also includes a special section dealing with the problems of installing heat exchanger and condenser tubes by the expanding method. Copies of TB-329B can be obtained free upon request to the sales offices of the division at Beaver Falls, Pa.

—AE—

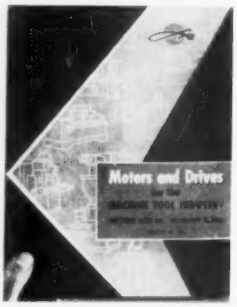
SEWER LINING—A new illustrated 8-page brochure describing T-Lock Amer-Plate, the continuous plastic sewer lining, has just been published by the manufacturer, Amercoat Corporation. This sewer lining is a high polymer vinyl resin sheet which is impervious to hydrogen sulphide and other sewer gases, acids, alkalis and salts. The two color brochure contains 16 photographs showing use in major sewer projects. Complete information is included on its composition, physical and chemical properties, and the method of incorporating the lining in pre-cast and cast-in-place concrete sewer pipe and structures. The new T-Lock Amer-Plate brochure is available now upon request from Amercoat Corporation, 4809 Firestone Boulevard, South Gate, California.

—AE—

AUTOFEED PRESSES—The complete line of Danly Autofeed Presses for high-speed production stamping with progressive dies is described and illustrated in the new Danly Autofeed Press catlog. Capacities range from 50 to 800 tons. Catalog explains how stampings can be turned out at a higher rate per hour and how to get the best efficiency out of costly progressive dies. Complete specifications include: ton capacity, stroke, S. P. M. range, shutheight, bolster size and thickness, bed opening, foot to bed height, slide adjustment, distance between uprights, horsepower, hand adjustment of slide, vertical upright opening, front-to-back upright opening, and all other significant dimensions. Write to Danly Machine Specialties, Inc., 2100 S. Laramie Avenue, Chicago 50, Illinois, for the "New Series H Catalog."

REFRACTORIES — This new 32-page catalog covers the entire range of Plibrico Products for the important Industrial Furnace field. In addition to description and illustrations of typical applications, a valuable material application chart is included. The catalog is illustrated in three colors and is available upon request to Plibrico Co., 1800 Kingsburgh St., Chicago 14, Ill.

—AE—



MACHINE TOOL—"Motors and Drives for the Machine Tool Industry," is the title of an informative and colorful brochure just published by The Louis Allis Co. Included are photos and information on many special and standard motors, and adjustable speed drives. Comprehensive descriptions and clear, large-sized photographs provide essential data on more than 15 motors and drives, plus more than 19 supporting illustrations on installations, and technical data on electrical features. Obtain "Motors and Drives for the Machine Tool Industry," Bulletin No. 1750, from the Louis Allis Co., Milwaukee 7, Wisconsin.

—AE—

STEEL BAR—A new 20-page brochure describing "FATIGUE-PROOF," a newly developed, high strength, free machining bar, has just been published by La Salle Steel Co., Hammond, Indiana. Containing 29 pictures and tables, the brochure discusses the product's advantages which include (1) high strength without heat treating, (2) ease of machining, (3) elimination of heat treating problems, (4) increased wear resistance, (5) minimum distortion, (6) higher fatigue resistance, and (7) uniform quality. Easy to read tables give the representative chemistry and physical properties of "FATIGUE-PROOF" and a special chart compares the properties (tensile strength, impact strength, fatigue resistance, wearability, machinability, torsion strength, yield point, etc.) of "FATIGUE-PROOF" with those of carbon and alloy heat treated bars and parts. Copies of the new brochure are available on request.

—AE—

THERMOCOUPLE WIRE—Twelve page Revere Engineering Bulletin No. 1701 lists conductor specifications, recommended insulations for various operating temperatures of standard thermocouple wires. Bulletin includes thermocouple wires built to Military Specifications; data on wire resistances, weights, EMF. Requests from Revere Corporation of America, Wallingford, Conn.

SWITCHBOARDS — General Electric's "building block" concept as applied to switchboards is described in a new four-color 40-page bulletin "Switchboards with Basic Circuits." The publication shows how eight classifications of standard switchboards are constructed, operated and tested. A complete discussion of basic circuit specifications in duplex switchboards is included. Requests for the bulletin, designated GEA-4127B should be addressed to the General Electric Company, Schenectady 5, New York.

—AE—

TUBE FITTINGS—Newly issued 20-page Catalog 4301 provides full dimensional information on new straight thread fittings with o-ring sealing, both Triple-lok flare and Ferulok flareless types. Included are machining dimensions and drawings for the internal straight thread boss, and listings of the counter-boring and thread-tapping tools. Available from your Parker distributor, or W. D. Wynant, Tube & Hose Fittings Division, Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio.

—AE—

CAST IRON—Specifications for six classes of metallurgically controlled irons are itemized in a new bulletin, entitled PRECISION CAST IRONS. Listed, in check list form, are both mechanical properties and tested applications. The SorboMat metallurgical system is used. The brochure is sent free by McNally Pittsburg Foundries, Inc., Pittsburg, Kansas.

—AE—

LP-GAS—The amazing success story of liquefied petroleum gas is told in a new brochure entitled "LP-Gas, the Cinderella Fuel." The three-color booklet is illustrated and readable in 15 minutes. It provides the most up-to-date, layman's description of an industry second only to television in growth rate, and with an estimated consumption of 5½ billion gallons in 1955. Copies are available for distribution to individuals, schools or other groups, upon request to Gulf Oil Corporation, Pittsburgh, Pa.

—AE—

SPRAYED METALS — New METCO Bulletin 120 illustrates and describes a wide range of applications of metallizing—sprayed metal—in the production of electrical and electronic equipment. Originally used to provide a soldering base on non-metallic materials, the use of this metal-spraying process has spread to applications in shielding, the production of other types of electrically reflective surfaces and in the replacement of wired circuits. Bulletin 120 also provides data on bond strength, conductivity characteristics, permissible coating thicknesses, circuit tests, surface preparation and spraying methods. For your copy write Metallizing Engineering Co., Inc., 1101 Prospect Avenue, Westbury, Long Island, New York.

—PP—

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A Few Suggestions

Registration is becoming increasingly important for professional engineers. If you have not done so already, you should be reminded to apply for registration and take the examination in engineering fundamentals as soon as practicable after graduation. Although your Moore School diploma permits registration in Pennsylvania without taking this first examination, there are a number of states which require it and, having taken it while the fundamentals are still fresh in your mind, you will be in a preferred position if you later desire to register in some other state. These examinations are given in Philadelphia, Harrisburg and Pittsburgh. The $10.00 fee for registration as an Engineer-in-Training, is counted as a part of the $25.00 total fee for registration as a Professional Engineer, after which the annual renewal fee is no more than that for an automobile driver's license. Hence, all considerations favor taking this initial step promptly.

As soon as you have gained the minimum professional experience required for registration you should follow through by obtaining your license as a Professional Engineer. Increasing numbers of graduate engineers have regretted failure to obtain their licenses early in their careers. Among other advantages, the license amounts to legal evidence of your having satisfied the minimum requirements for recognition as a Professional Engineer. Whether necessary or not for your initial assignments, this license gives you added stature in your work and among your neighbors. You probably will need it sooner or later, and should be prepared for the time when it may become an important practical asset.

At your first opportunity, of course, you should join AIEE, IRE, or another technical society representing your specialty. You should also affiliate yourself with the local Society of Professional Engineers. Become active in committee work. Perhaps you will occasionally enter a prize paper competition. Take advantage of every possible opportunity to encourage and accept invitations to speak on any subject in which you have an interest. Too many engineers find themselves tongue-tied when they get on their feet. The standard formula is simple: What is it?—What does it do?—What are the results? Talk from notes if you must, but above all, avoid reading your speech. In many cases this type of activity leads to an unexpected opportunity for professional advancement, such as would have been lost if you had not thus voluntarily demonstrated the particular mental and personal qualifications required.

Strange as it may seem at first thought, I am sure that political activity in your community, leading to eventual election as a Councilman or School Board Director will present the first and one of the finest opportunities for gaining valuable experience in the development of professional stature, which requires mobilizing the full potential of all your cultural and emotional faculties in dealing with people and ideas. Without belaboring the points, I shall list briefly the reasons why I have come to this conclusion:

1. It presents an unusually fine opportunity to become acquainted with your neighbors and for them to come to know you as a Professional Engineer.
2. Running for office compels a measure of extroversion and speech making which can become extremely useful. Furthermore, some of your political associates may eventually become legislators who will have learned to seek and respect your opinions on important questions concerning your welfare and that of your community.
3. As a Councilman or School Board Director, you will gain experience at the policy making level, where decisions have to be made and controversial problems have to be resolved, even though the choice between yes and no is a very close one and may be distasteful.
4. One must rely upon his own analysis and judgment, knowing that he must speak promptly on the subject under discussion, even if only to give a convincing reason for postponing a final decision.
5. The opportunity for open-minded and constructive debate in a highly competitive and frequently emotional atmosphere provides invaluable experience.
6. One learns to listen without interruption while his opponent talks. He may be telling you something you should know. In any event, you will thus gain time to think out an appropriate answer which will help you gain your point without embarrassing yourself or your opponent whom you must assume to be equally interested in reaching a wise decision.
7. It provides an opportunity for practice in the art of calm, impersonal and constructive interrogation. By this device, an advocate may occasionally lead his opponent to agreement upon a soundly conceived opinion, in situations where argument may fail.
8. One will learn that threats of reprisal will glance off the shield of integrity which is the armor of an engineer, whose authority is of evidence and reason.
9. There will be opportunities, of course, for errors of fact, logic, or opinion. If possible, you should be the first to recognize and compensate for them. One usually learns more from an occasional error than from a number of successes. In any event, many people will think you are wrong, no matter how you voted on the question according to your conscience and in the light of the information available at the time.
10. Meanwhile, the community will have benefited, by having you bring an unbiased, scientific, fact-finding approach and your ingenuity to the solution of its problems.

Active participation in community affairs is especially important for engineers who seldom have an opportunity to become known as intimately as physicians and lawyers, for instance, whose very practice requires dealing principally with the personal problems of their neighbors. All of this activity will require much effort and there will be times when you wonder whether it is worth the trouble, but you will find that your professional dealings with your clients, or employers and associates will be greatly enhanced by the experience gained. Furthermore, you will be well on your way to achieving the greatest possible satisfaction in your engineering career and in your life, having the respect and good will of your neighbors as well as that of your professional associates.

—PP—

That's —PP— for this month but don't miss us in the big, special February issue of the AE. This interest-packed Engineers' Week publication will hold you in your easy chair for hours!

Mitchell

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central theme of this article; but I think that it is well to remember that financial considerations are of paramount importance and that, no matter how fine and efficient an organizational pattern or how splendid a management training program a company has, it can strike out in keeping topnotch people if it doesn't supply them with topnotch remuneration and the opportunity to advance financially as well as technologically or administratively.

A GOOD base salary, it seems to me, is most important, with the "fringes" as additional incentives. The organization of executive compensation plans, stock purchase plans, and so on, varies from company to company; but they can also be all-important in being fairly enough spread to give people the incentive to remain with the company. They seem to be particularly important in establishing incentive in a company where there is decentralization of management because they represent concrete rewards for the greater responsibility that goes implicitly with decentralization.

To sum up, we at Sylvania are sold on decentralization. It both develops and makes more efficient use of executive talent. It creates a dynamic industry of many leaders, instead of just one or a few leaders and many followers, all too prone to slip into that dangerous caetgory of mere "yes-men."

Of course, decentralization of management is not without its margin of error. Mistakes will be made, and perhaps they will even show up more baldly under a decentralized scheme where it is harder to "pass the buck." But mistakes are made by everyone at one t ime or another; and they are also perhaps our most effective teachers. The important thing is to learn not to repeat them.

Moving with the trend toward management decentralization, therefore, we recognize it as a force to accomplish great things for American industry and broaden the base of opportunity for all.—***End.***

About the Author . . .

Don G. Mitchell

Don G. Mitchell, chairman of the board of directors and president of Sylvania Electric Products Inc., was born in Bayonne, N. J., in 1905. He attended the University of Cincinnati for two years, taking a cooperative course in mechanical engineering, and the University of Florida for two years, specializing in mathematics.

He taught mathematics in Montclair (N. J.) High School for a short time before entering the sales field with McGraw-Hill Publishing Company. He has also been director of industrial development for the Niagara Hudson Power Company, manager of the Marketing Division of the American Can Company, and a sales executive with both Marshall Field and Company and Pepsi-Cola Company. He joined Sylvania in 1942.

Mr. Mitchell is a director and chairman of the Executive Committee of the American Management Association and is active in many other organizations. He has received honorary degrees from Rensselaer Polytechnic Institute and the Stevens Institute of Technology among others, and he is a member of the Corporation of the Polytechnic Institute of Brooklyn.

He resides in Summit, N. J.

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at the minimum amount set by the Administrator. Suppose that a young engineering graduate decides that he would rather take a lesser-paying job at the start of his career because of his interest in the particular type of work, or because he likes the future possibilities for professional growth in that job or field, or because he thinks the professional employment conditions justify a sacrifice of some immediate monetary gain, or any number of other reasons which might influence him. Should he, therefore, have to sacrifice professional status and become a "clock-puncher"? We think not.

The National Society of Professional Engineers is vitally interested, as much as the Administrator or any other official can be, in denying the claim to professional status, insofar as engineering is concerned, for those not entitled to it. We feel strongly on this point because one of the greatest problems facing the engineering profession is caused by the granting of professional engineering titles to those who are not professional engineers in fact, but are technicians, administrative employees, shop employees, etc.

The separation can be made without a salary test. The balance of the Administrator's definition (it is a fine one and has stood the test of time) provides a full and adequate means for the Administrator to evaluate the professional status claim in terms of the type of work performed, the background and education of the individual and the degree of intellectual application of this background to the job. We know it can be done on that basis, without a salary test, because the National Labor Relations Board has been doing it since 1947 when the professional definition, similar to the Wage-Hour Administrator's definition, was written into the law. The NLRB has not needed a minimum salary test to meet its responsibilities in separating professional employees from nonprofessionals and it has made the necessary findings in hundreds upon hundreds of cases without any undue administrative burdens.

The inclusion of the minimum salary test, in fact, encourages the practice of granting professional titles to those not qualified for them under the more decisive terms of the definition, because the nonprofessional employee earns as much or more than the professional test requires. It makes it easier to subscribe to professional status and title by looking too much at the amount earned and not enough at the requirements for knowledge of an advanced type, specialized intellectual instruction and study, original and creative work, the consistent exercise of discretion and judgment and work which is predominantly intellectual and varied in character. We suggest that the Administrator can make the distinctions required by the law by following strictly his existing definition, but without the crutch of a minimum salary test which may serve to penalize young engineering graduates by denying them one of their most important assets—their professional status. We recommend that the Administrator repeal the salary test for professional employees.

Status of the Registered Engineer Compared to Registered Doctors and Lawyers

Over the years the Administrator has recognized that certain vocations or callings are so clearly "professional" that there was no need to refer to a salary test to establish the professional exemption provided by the law. To date medicine and law have been recognized in this special category. This special consideration, in the words of the Hearing Officer in 1940, was "applicable only to those who have actually acquired the special status referred to—in other words, to those who have received a state license or certificate to practice law or medicine. The action of the appropriate state authority in issuing the certificate or license may be taken as an adequate substitute for the salary test in the case of the professions of law and medicine."

Or, in other words, where a vocation or calling is clearly recognized as being in the professional category, and where the state legislatures have provided a method for certifying the professional competence and status, and where an individual has met the state requirements and obtained a certificate in the professional field, there is no need for the Administrator to impose an artificial test of minimum salary requirements to test the professional status. We are in complete accord with this view. We ask that the same reasoning and standards be applied to the engineering profession which is as clearly a recognized profession today as is law and medicine.

Just as in law and medicine, the special exclusion from the salary test is proposed for those who hold a valid license or certificate permitting the practice of professional engineering and who are actually engaged in the practice thereof. This refers to professional engineers who are employees, just as the present regulation applies to lawyers and doctors who are employees.

We base this recommendation on exactly the same criteria and standards applicable to law and medicine. The state legislatures of every state in the United States have enacted a law, which declares that engineering is a profession, and have established high standards and procedures for those qualified to apply for a certificate or license. The same action has been taken in the territories and possessions of the United States. And the Congress of the United States has adopted a similar law for the District of Columbia. We respectfully submit that since every legislature and since the Congress of the United States has declared the professional status of licensed engineers there is no justification or warrant for the Administrator to ignore that fact in providing the special exception for licensed and certified professionals.

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The report of the Hearing Officer in 1949 discussed this same recommendation at some length but, after admitting some merit in the proposal, recommended against the addition of engineering to law and medicine "at this time." It was stated that the practice of law and medicine has a long history of state licensing and certification, and that the licensing of engineers is relatively recent. The first state engineering registration law was passed in 1907. This may make state licensure for engineers "relatively recent," but so is our great technological development and expansion, based on engineering, "relatively recent." The rapid spread of state engineering registration from one state to all states, territories, possessions and the District of Columbia in less than 50 years should be convincing proof of the need and desirability of such state action. If engineering is a young profession, compared to law and medicine, it by no means follows that it requires "junior" treatment by the Administrator.

We would like to call to the attention of the Administrator the amazingly rapid growth of engineering registration under the state laws. The following table of the number of registered engineers in the past 25 years contains the figures compiled by the National Council of State Boards of Engineering Examiners:

1930	10,000
1935	30,000
1940	64,000
1946	90,000
1952	176,000
1955	197,000

There can be little question, as seen from these statistics, that engineering registration is a well-accepted standard and that in the foreseeable future it will be the benchmark of professional status.

The Hearing Officer in his 1949 report also stated that ". . . it is impossible for a doctor or lawyer legally to practice his profession without a certificate or license (but) many . . . engineers perform work in these fields without possessing licenses, although failure to hold a license may limit their permissible activities to those of lesser responsibilities."

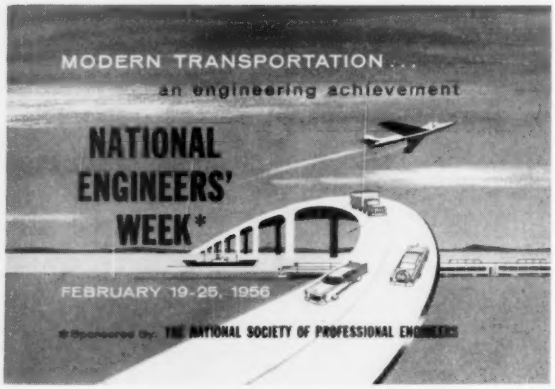
Bearing in mind that we are referring only to employees, as distinguished from self-employed practitioners who offer their services to the public, we know that it is possible for a person to be engaged by a company for legal work without the requirement of registration or license to practice law. We believe, however, that the nature of the assignment must be internal as contrasted to direct service to the public. Likewise, this is the case in engineering. The requirement for registration extends to those who offer their services to the public.

The fact is, however, that the vast majority of those who have complied with the state engineering registration laws and secured their certificates are not in private practice. They are mostly employees in industry or Government, and other fields. Registration under the state laws is open to any and all engineers who qualify, and increasing use of the licensing procedure is being realized as shown by the above figures.

Therefore, why should the great number who have seen fit to qualify under the state laws be denied the same recognition and status accorded other licensed professionals because some have not yet taken the certification step open to them.

It is not material or pertinent to this point that "no hardship will follow from the failure to adopt the proposals of the . . . engineers since the evidence shows that the type of engineer . . . who holds a state license to practice the profession and who is actually performing the work which his license authorizes him to perform will, except in the most unusual cases, meet the salary requirement contained in the regulations." (Statement of Hearing Officer, 1949)

This is equally true today as shown by our salary survey of income for 1954. To qualify for a professional license a person must have a minimum of four years of engineering experience. Those entering the profession in 1950, according to our survey, which is the first year of entry which would qualify them for full professional licensure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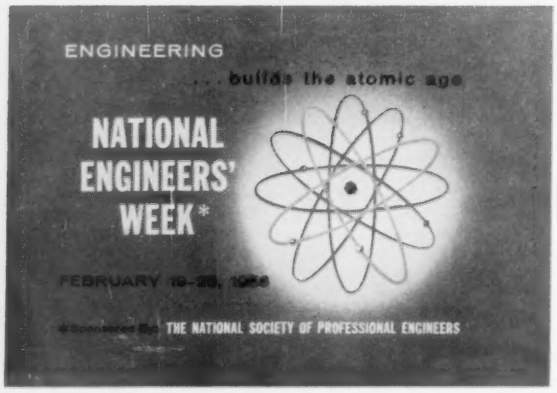

Testimony

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in 1954, had a median income of $5,360 and the lower decile was recorded at $4,780. In both instances these figures are well above the present salary requirement. Nevertheless, the point remains that the same could be said of the legal and medical professions and they are not given the exception based on median or average earnings. Rather, they are given the exception because they are well-recognized professions and their members have been certified by the states as professionals. Accordingly, it is not necessary or desirable for the Administrator to go beyond the state action. Our position and recommendation are based on the same idea.

Finally, the Hearing Officer in 1949 stated, "I do not see how deleting the salary requirement would advance the recognition of these activities as professions or for that matter, that any such action is necessary to prove that these are bona fide professions." We are sure that the Hearing Officer wrote in good faith in stating the acceptance of engineering as a profession. But that does not answer the obvious fact that there is a discriminatory and unjustified distinction made between law and medicine on the one hand, and engineering on the other hand. We are in complete sympathy with the sentiment expressed by the 1949 Hearing Officer when he said that there are within the professional fields many employees with professional titles who are not employed in a bona fide professional capacity because they are performing work which utilizes little, if any, professional training. If any be found in this category they can be and should be excluded from the professional definition by its very terms and conditions. By the same token, we assume that a certified lawyer, for instance, could be engaged in work which does not meet the general professional definition, and we further assume that the Administrator would deny such a person the professional exemption.

For the record, we should point out that licensure under the state engineering registration laws is based in most cases on the requirement that a person be a graduate of an approved engineering curriculum of four years or more, plus not less than four years of engineering experience; that the standards of the accredited engineering schools are checked and approved by the Engineers' Council for Professional Development, the generally-accepted accreditation agency in the engineering field; and that qualifications of the applicants are assessed by a state board of engineering examiners appointed by the Governor of the state.

The United States Supreme Court in 1896 recognized that "formerly theology, law and medicine were specifically known as the professions; but as the applications of science and learning are extended to other departments of affairs, other vocations also receive the name." In view of the action of all the state legislatures, in view of the action of the United States Congress and in view of the rapid development of the engineering profession which is now in the forefront of professional activities directly related to our national economy and national defense, we feel justified in asking the Administrator to extend the same professional status and recognition accorded law and medicine.

We conclude by recommending that the proviso of subsection (e), Sec. 541.3 of the regulations, be amended to include the word "engineering" after "law or medicine."

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Nat. Dir., O. J. Scherer, 300 Boston Ave., Las Vegas, Nev.

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Exec. Sec., John T. West, Jr., 228 N. Second St., Harrisburg, Pa.
Nat. Dirs., Robert Miller, 405 N. Lehigh Street, Tamaqua, Pa.; Ezra K. Nicholson, 1618 Latimer St., Philadelphia, Pa.; Donald C. Peters, 210 E. Parkway, Pittsburgh, Pa.; C. L. Kreidler, Lehigh Struct. Steel Co., Allentown, Pa.

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Nat. Dir., H. F. Carpenter, 37 Ernest St., Providence, R. I.

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Exec. Sec., Henry Harkleroad, 403 Nash Bldg., Austin, Tex.
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Exec. Sec., David Lombardo, 512 1st Ave. North, Seattle, Wash.
Nat. Dir., Kendall M. Wood, 228 Hutton Bldg., Spokane, Wash.

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Exec. Sec., Ross B. Johnston, P. O. Box 249, Charleston, W. Va.
Nat. Dirs., Leslie C. Gates, P.O. Box 672, Beckley, W. Va.; Harry G. Kennedy, 1307 Kanawha Valley Bldg., Charleston, W. Va.

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Pres., A. Owen Ayres, 128 Graham Ave., Eau Claire, Wis.
Sec., Harold N. Kingsbury, 575 Toepfer Ave., Madison 5, Wis.
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What's New

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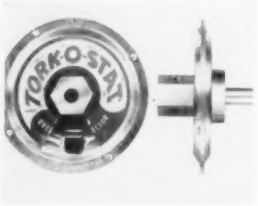
SLIP-CLUTCH OVERLOAD PROTECTOR — item 1



For use with "Take-off" drives, rather than in-line direct drive, the Type "S" TORK-O-STAT has a sturdy hub on one side for double set-screw connection to the drive shaft, and a shaft extension, mounted in a needle bearing, on the other side for mounting pulley, sprocket, gear, or flexible coupling. It is a self-contained unit that is easily installed between a driving and a driven mechanism which releases itself when an overload or jamming occurs and resets itself automatically when the overload or jam is removed.

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AUTOMATION COUNTERS — item 2

Victor Digit-matic Printers are basic adding or multiplying machines equipped with electrically actuated keys. By this means it is possible to introduce figures into the machines electrically—at high speeds—and without the need of an operator. The Digit-matics have an extremely wide range of versatility for use with punched tape recorders and readers, punched tape typewriters, electronic counters, computers, time interval meters, nuclear scalers, adding and subtracting counters, radiation counters, digital weighing scales, production counting and many other uses in automated equipment.

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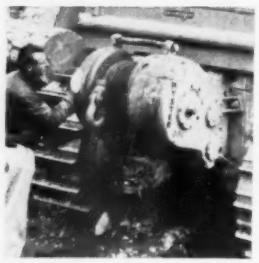
WORLD'S LARGEST TOWING WINCH — item 3



World's largest towing winch of matched design for the huge new Caterpillar D9 crawler tractor is announced by Hyster Company. The new Hyster winch, model D9A, develops a line pull of 76,000 lbs. Features a constant mesh transmission, flexible cable controls, built-in drawbar, cast alloy-steel drum, 15-inch brake, hardened gears throughout and brake compartment sump. Weighs about 3,250 lbs. Barrel diameter of drum is 16", flange diameter 27", barrel length 11". Cable capacity is 269' of $1\frac{1}{8}$" line or 217' of $1\frac{1}{4}$".

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SUBMERSIBLE BOOSTER PUMP — item 4

Layne & Bowler Pump Company and General Electric have joined in producing the "Verti-Line Submersible Booster Pump" designed specifically to meet the rigid requirements of industrial and municipal pump users. Embodies many refinements such as: oversize shaft, longer bearings with protective caps, perihedral impeller seals, mechanical shaft seal designed specifically for submerged service, and a choice of either mixed-flow or radial-flow impellers. The General Electric Submersible Motor has a larger oil reservoir and a spring-loaded resilient bag which permits the sealed motor to breathe with changing pressures and temperatures.

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PUTTY HARDENS INTO PERMANENT METAL — item 5

Sculp-Metal, an aluminum compound in putty consistency, with unlimited industrial design, repair and maintenance applications, is ready to use as it comes from the can, without mixing, weighing or catalyst. It air-hardens into permanent metal of any desired thickness without flux, chemicals or baking.

This column describes new products of general interest to professional engineers. For further information, fill in the coupon provided and mail to the AMERICAN ENGINEER.

IMPROVED SURVEY TRANSIT — item 6

A new $5\frac{3}{4}$" survey transit with many improvements for quicker, more precise setting is announced by Umeco. Included are rifle sights that bring the telescope on the target immediately, focusing knob through telescope axis that permits easy setting regardless of telescope position, improved graduated plate and other new features. Reported to be thoroughly dependable and accurate even when subjected to rugged use.

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PHOTOCOPIES ORIGINALS, MICROFILM — item 7

The Duomatic, the newest photocopying development of Duophoto Corp., is a positive dry reproduction system which will produce a black on white positive copy from any written, typed or printed original or microfilm "blow-up." By this process, transparent, translucent or opaque originals, single or double sides, regardless of color, can be reproduced onto a single sheet of paper, without negative, matrix, master or any other intermediate step. Makes a positive, dry print. Desk size, it copies material up to 14" in width, of any length, and produces up to 125 letter-size copies per hour.

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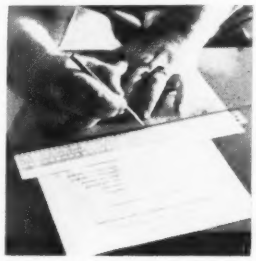
FOR DRAWING DOT AND DASH LINES — item 8

A template for drawing dot and dash lines with a rapid stroke of a pencil or ballpoint pen, is a new product of dot-N-dasher. Produced by a professional engineer for making piping drawings, it is applicable to any type of broken-line drawings. Will produce six different lines: long dash, short dash, long dash and dot, short dash and dot, long dash and two dots, and short dash and two dots. Made of exceptionally strong and durable transparent plastic (Mylar), 0.0075" thick.



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ALL PURPOSE LUBRICANT — item 9

Ore-lube, by the Ore-lube Company, having MoS_2 as a base, is available in grease and oil in various viscosities to secure every industrial and mechanical lubricating need. Through a unique homogenizing process Ore-lube contains an even dispersion of Molybdenum Disulfide which has a tenacious adherence to plate surfaces lubricating under pressures of 100,000 lbs. per square inch thereby preventing metal wear. It can not be washed out or be squeezed out. Able to withstand temperatures ranging from a minus 20° to plus 500° F., eliminating seasonal oil changes.

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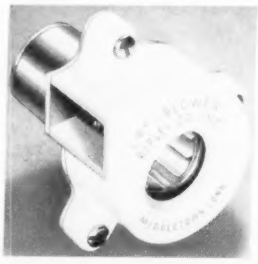
SUB-MINIATURE BLOWER — item 10

In answer to industry's demands for a sub-miniature blower, L-R #1 is announced by Ripley Company as the smallest self-contained Motor/Blower available—engineered for space-conscious designs. Using a 1" diameter impeller, this unit will efficiently move 8 CFM at 1" static pressure when running at 20,000 RPM. Total weight of blower and motor unit is less than $2\frac{3}{4}$ ounces. Meets military specifications. Available in CCW and CW rotation.



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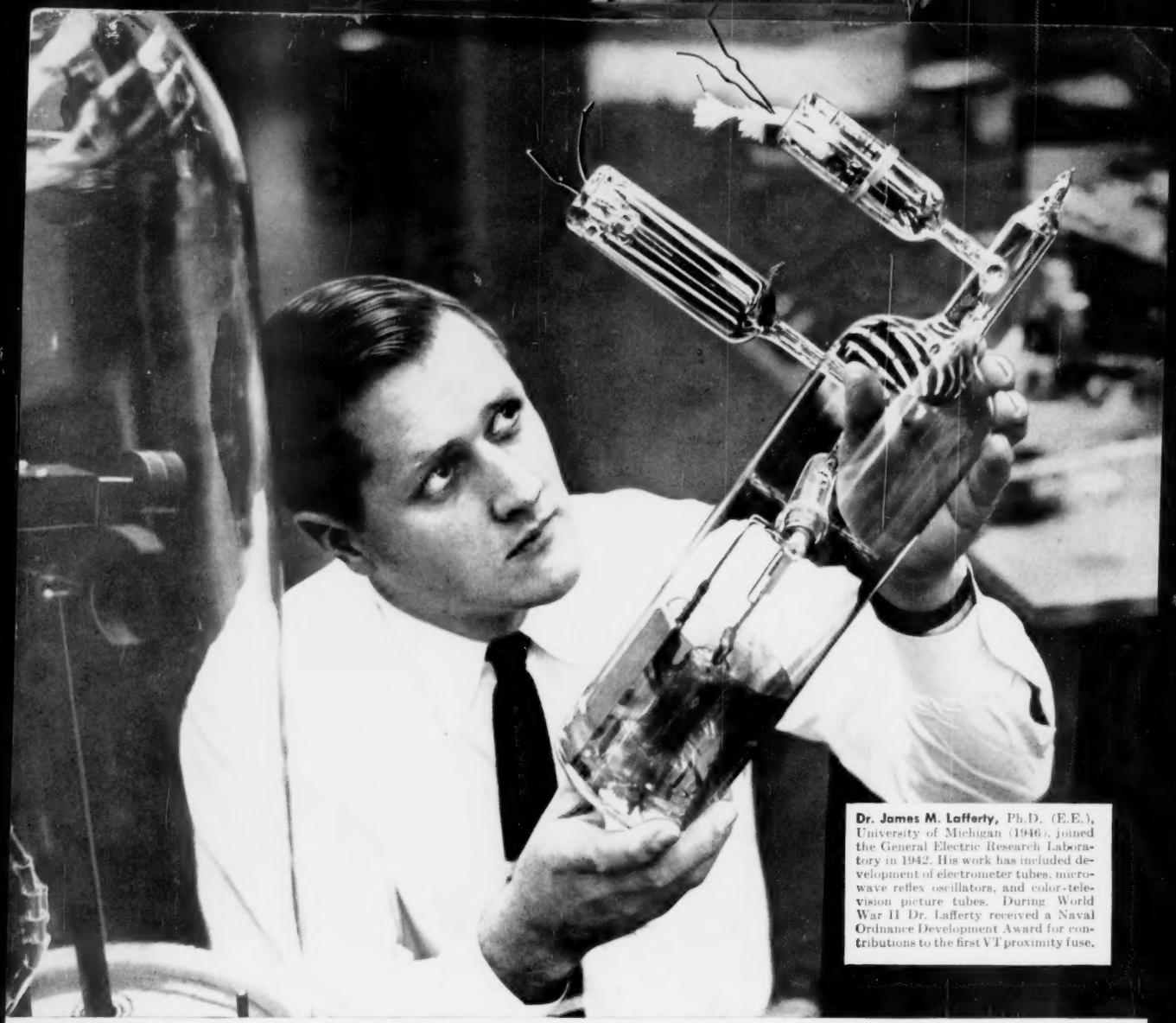

Dr. James M. Lafferty, Ph.D. (E.E.), University of Michigan (1946), joined the General Electric Research Laboratory in 1942. His work has included development of electrometer tubes, microwave reflex oscillators, and color-television picture tubes. During World War II Dr. Lafferty received a Naval Ordnance Development Award for contributions to the first VT proximity fuse.

New stability for cathodes

General Electric's Dr. James M. Lafferty uses metal compounds to achieve reliable electron emission

For as long as they have known how to make vacuum tubes, scientists have been seeking cathodes combining high emission with low evaporation—materials that will give off many electrons, but few atoms. Because of their emission efficiency, oxide cathodes always have received most of the research attention. Now, however, Dr. James M. Lafferty of the General Electric Research Laboratory is taking an entirely new look at the problem. He has developed cathodes made of metallic compounds which are chemically stable and demonstrate low evaporation rates at current densities where oxide cathodes evaporate too quickly to be useful. These features have made Dr. Lafferty's *lanthanum boride emitters* indispensable in the electron guns used for high-energy accelerators and other systems where stability is required under difficult conditions. Using interstitial compounds, scientists can build a cagelike framework around the atoms of metals known to be good emitters; the framework acts as a "sieve," which lets electrons pass through, but holds back evaporation of the atoms themselves. Dr. Lafferty's metallic emitters are now beginning to approach oxide cathodes in efficiency, while surpassing them in long-life reliability.

Progress Is Our Most Important Product

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